United States. Circuit Court of Appeals
for the Second Circuit.

American Graphophone Co.)
vs.) No. 94
American Record Company)

U. S. CIRCUIT COURT. FOR THE SOUTHERN
DISTRICT OF NEW YORK.

American Graphophone Company)
) In Equity
versus) No. 8939
) (On Jones Patent)
American Record Company)

U. S. CIRCUIT COURT OF APPEALS
FOR THE SECOND CIRCUIT.

American Graphophone Company)
) No. 94
versus) Docket No.
) 2665
American Record Company)

2665

American Graphophone Company, Complainant-Appellant,
American Record Company Defendant-Appellee.

E. K. Camp.
Circuit. So. N.Y.
S. O. Edmonds.

15.00 1906
6.00 Mch 28 Filed transcript of record.
.25 " 29 " appearance Appellant by P. Mauro.
.25 Apl 17 " " Appellee by S. O. Edmonds.
.5 June 30 U.S.
18.25 Oct 3 Filed 9 copies record.
3.25
.00 " 13 " brief Appellant.
.00 Nov 4 " " Appellee
1907
Jan 14 Decree reversed. Townsend J. #9656.
2.0 " 26 Filed papers on form of mandate
.00 " 26 " order for mandate
.45 " 28 " bill of costs.
.20 " 28 Issued Mandate
17.70 June 30 U.S.

2666

In the Matter of Adolph Kuffler, Bankrupt Appellant.

Benjamin Tuska
Dist. East. N.Y.

9 58422

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IN THE CIRCUIT COURT OF THE UNITED STATES

FOR THE SOUTHERN DISTRICT OF NEW YORK.

AMERICAN GRAPHOPHONE COMPANY
vs.
AMERICAN RECORD COMPANY.

In Equity,
No. 8939.
(On Jones Patent). 506

Complainant's proofs in rebuttal taken for final hearing before JOHN A. SHIELDS, ESQ., Standing Examiner, under and pursuant to Rule 67 of the Rules of Equity of the Supreme Court and the rules of procedure of this Court, at the office of Messrs. Mauro, Cameron, Lewis & Massie, No. 90 West Broadway, New York City, this 12th day of September, 1905, at 10 o'clock in the forenoon. 507

Met pursuant to agreement.

Present—
C. A. L. MASSIE, ESQ., for complainant.
S. O. EDMONDS, ESQ., for defendant.

508 Thereupon VICTOR H. EMERSON, a witness produced on behalf of complainant, being duly sworn, in answer to interrogatories by Mr. Massie, testified as follows:

Q. 1. Please state your name, age, residence and occupation?

A. Victor H. Emerson; age, 39; residence, 521 West One Hundred and Eleventh street, New York; occupation, record maker for the Columbia Phonograph Co.

Q. 2. Please state what experience you have had in the talking-machine business?

509 A. The past seven years I have been daily engaged in making original records for the Columbia Phonograph Co. Prior to that time, for about three years I was making records for the United States Phonograph Co., and four or five years previous to that, for the New Jersey Phonograph Co. I have been practically engaged in engraving sound-records for thirteen or fourteen years.

Q. 3. What knowledge have you of what has been
510 done by other talking-machine companies, other than those you have mentioned, during all these years?

A. The laboratories of the various cylinder record manufacturing companies were open to the public and are practically still open to-day. The laboratory of the Gramophone Company, which was conducted by Mr. Childs, when he was engaged in making disk records by the zinc etching process, was in New York City, was also open to the public. What I mean by this is, the apparatus was in full view of the singer or
511 other talent, and there was no secret about it. I have personally visited the laboratory of Mr. Childs, while he was making records by the etching process, and there saw the process in operation. It was not until after the adoption of what, in my opinion, was a wax engraving process, that there was any secrecy attempted in the manufacture of disk original wax records. Since that time, the various processes have been kept quite secret and the recording apparatus of all of the various disk record makers
512 shut from the view of the talent or visitors, and the horn into which the singer would sing was put through a hole in a partition. In visiting the laboratory of the Zonophone Company, who manufacture disk records, while I could not see the recording-machine, I could distinctly hear from the horn the peculiar cutting sound due to the action of a needle cutting into a moderately hard wax or wax-like material. I have not been in the laboratory of the other companies engaged in making disk records, but from the character of their

513 records and the similarity between all of them, and from the fact that I have made microscopic enlargements of all of the various disk records, I believe that the original records are all made by engraving in a wax or wax-like material; that this original record is copper-plated to form a die; and the commercial record that is sold pressed into a material which has been made plastic under heat.

Q. 4. Describe briefly, so far as you know, what methods have been practiced in making hard disk sound-records? 514

A. The zinc etching process, which consists in taking a zinc plate, coating it with a thin coat of wax or wax-like material, and placing it upon a recording-machine that would remove the wax coating at that part where the recorder touched the plate and exposing the zinc. This plate was then put in an etching bath and the record lines etched. The other practical scheme is having a wax or wax-like tablet, making the record by removing or engraving the wax to form the record. 515 The wax record is then plated to form a die, and records pressed into a material made plastic by heat.

Q. 5. What other practical methods are known to you for making hard disk sound-records in a commercial manner?

A. There are none that I know of.

Q. 6. If there had been any other, do you think you would know of it from your experience in the art?

A. I think so.

Q. 7. What method is now used? 516

A. The engraving method.

Q. 8. Do you mean that this is the only method now used, so far as you know?

A. I do.

Q. 9. Are you the Victor H. Emerson who gave a deposition for complainant in American Graphophone Co. vs. Universal Talking Machine Mfg. Co.?

A. I am.

517 CROSS-EXAMINATION BY MR. EDMONDS:

x-Q. 10. Am I correct in assuming that the Columbia Phonograph Co., by which you are employed, is the concern through which the American Graphophone Co. makes and sells its output of disk records?

A. Yes, sir.

x-Q. 11. And this has been the case from the start of the American Graphophone Company's business?

518 A. Yes, sir.

x-Q. 12. Am I also correct in my understanding that, disregarding certain work on a toy graphophone disk record, which lasted but a short time, the disk record business of the American Graphophone Co. and the Columbia Phonograph Co. was commenced about April, 1902?

A. Yes, sir.

x-Q. 13. And you have been personally connected with the disk record work of those concerns since that

519 time?

A. I have.

x-Q. 14. Has it been your duty since that time to supervise all of this work, down to the completion of the matrix or stamping die, subsequently used for pressing the ultimate commercial record?

A. My real duty and responsibility ends with the manufacture of the wax original record. The responsibility for the completion of the die is with the factory at Bridgeport. I am in constant contact with

520 that part of the work, however.

x-Q. 15. And that has been the case since April, 1902?

A. With the exception of a few months when we made the dies here in New York.

x-Q. 16. Please state as briefly as possible, but giving necessary details, just what is the process employed by the two companies you have referred to, commencing with the preparation of the original wax tablet, and ending with the completion of the commercial sound-records?

521

A. First, we engrave a zig-zag record in wax, or wax-like tablet; second, this original record is copper-plated with a shell about $\frac{31}{1000}$; third, this shell is backed with type metal or other metal to a thickness of about one-eighth of an inch; fourth, the surface is then nickel-plated; fifth, it is then placed in a die, heated, and record material which has become plastic by heat is placed upon the die and then pressed in a hydraulic press and allowed to set and cool. Then it is taken from the press and the commercial record 522 removed from the die.

x-Q. 17. Have you now stated the process as it has been employed by the Columbia Phonograph Co. from April, 1902, down to date?

A. I have.

x-Q. 18. The copper shell, to which you refer as the second step, is, then, the stamping matrix?

A. Yes, sir.

x-Q. 19. And how many of these do you make from the original record? 523

A. That all depends upon the care with which the electro-plater handles the wax original. We get sometimes as high as five stamping shells from one wax original. One of these is held as a master record from which we make duplicates, if we need them. This branch of the business is factory work and I have no positive knowledge as to the average number taken from the wax tablet.

x-Q. 20. How is the original wax tablet made conductive so as to permit the shell to be electro-deposited 524 thereon?

A. We coat it with graphite.

x-Q. 21. How, by brushing it on?

A. Yes, sir.

x-Q. 22. Is that the only thing done to the wax tablet between the steps of cutting the record and placing it in the plating bath?

A. Yes, sir.

x-Q. 23. Is the composition of your wax tablet re-

525 garded as a secret, and do you refuse to divulge the formula?

A. I will divulge the formula. It consists of five parts of what is known as our x3p wax, which is a wax we formerly put out commercially to the public, one part paraffine, and one part spermaceti. We have used many other combinations of waxes, but this is the formula we are using now.

x-Q. 24. What are the constituents, and what is the
526 method of preparation, of the x3p wax?

A. That is disclosed in our patent, of which I do not know the number. The base of it is stearic acid; particular ingredients and methods of making this wax are not fresh in my mind at the present time, and I cannot answer intelligently without looking up the patent.

x-Q. 25. What are the character and form of the cutting-style which you employ?

527 By Mr. Massie: Objected to as not proper cross-examination, and the witness may refuse to answer if his answer would involve any trade secret.

A. We use both steel and sapphire, the point of which is about $\frac{5}{1000}$, across the bottom part; the lower edge is rounding. Sometimes the edge that cuts the side of the walls is keen and sharp, and sometimes it is dull. It is a question merely of get-
528 ting the particular tone that is wanted, and if a dull recorder gives a desired tone for certain effects we continue using it for those effects. We have used both sharp points and dull points.

x-Q. 26. How long have you been using precisely the form of cutting-style that you now employ?

A. We have been using all of these forms since we started to make disk records.

x-Q. 27. What other forms did you use when you started to make disk records?

A. These same forms.

529 x-Q. 28. Then you have not varied the form or character of your cutting-style from April, 1902, down to date?

A. In my previous answer I show a variation of form, both sharp and dull side cut, but outside of those forms we have not varied.

x-Q. 29. Who got up these several forms of cutting styles?

A. The first one, by a man named Jones; after that, Mr. Thomas H. Macdonald, Mr. Frank L. Capps, Mr. 530
William Frieberg, Mr. James K. Reynard, Mr. Charles Carson, Mr. Clarence Jones, and myself. These men are all record makers and in general they make their own apparatus.

x-Q. 30. When this work of disk record making was first commenced by the Columbia Phonograph Co. were you then concerned only with the making of the original wax records and not with the subsequent steps of the process?

A. When the work first began, in April, 1902, I 531
both made the wax originals and for a short time thereafter plated the wax originals and furnished the completed matrices; subsequent to that time the records were sent to our factory at Bridgeport to be plated.

x-Q. 31. That was after your work on the process here in New York had perfected the process ready for commercial exploitation?

A. No, because before that time we sent the stamping dies to the factory and they used them to press up records from, but their copper-plating facilities were 532
over-taxed with their cylinder records.

x-Q. 32. You have referred to the fact that at one time the laboratories of various concerns were open to the public, is the laboratory of the Columbia Phonograph Co. open to the public and is the public permitted to witness all the steps of your process?

A. The laboratory in New York is not open to the public; but part of the process, such as the stamping of records, is open to whatever visitors should go to the factory. We have thrown our laboratory open to

533 most all employees and officers of the Company and from time to time to about two hundred visitors who were interested in phonograph matters.

x-Q. 33. Do you mean that every step in your process from the compounding of the wax for the original tablet down to the completion of the commercial record, may be witnessed at any time and by any one coming as a " visitor " ?

A. I do. All of our wax is manufactured at our
534 laboratory, where we make blanks about every day, the wax is in barrels and boxes exposed to view, they must pass through this room to get to our recording-machine, and in the room where the wax is made we have our hydraulic press and our electro-plating bath for the purpose of making test records.

x-Q. 34. Does this apply to competitors in business ?

A. It does not.

x-Q. 35. Does it apply to persons not competitors but familiar with the art of recording and reproducing
535 sound, as, for instance, an expert in that art ?

A. I do not know of any experts in the art of recording that are out of employment.

x-Q. 36. Will you permit me to visit your laboratory this afternoon and observe your practice of the process as you have detailed it in this examination ?

A. In view of the fact that you are attorney for the opposition, I would not. If you were not attorney for the opposition, and were interested in this from a scientific point of view, I would, and would do so with
536 pleasure.

x-Q. 37. When first did you perform the operation (or have it performed or see it performed) of cutting a zig-zag groove in a wax or wax-like disk ?

A. A short time prior to my taking charge of the disk recording for the Columbia Phonograph Co., Mr. Easton sent Mr. Jones to me with a machine, which Mr. Jones brought and set up at my laboratory at 1155 Broadway, where he made a record for me. A short time prior to Mr. Jones' arrival, I had begun operations on making a disk machine, but did not have it in working shape when Mr. Jones arrived. 537

x-Q. 38. Do you mean a machine for recording by means of the zig-zag groove in a wax-like disk ?

A. Yes, sir.

x-Q. 39. Did you make this before or after you heard of Jones and of his process of cutting a zig-zag groove in a wax-like disk ?

A. I started it before I saw Mr. Jones, but did not complete it after I met him. 538

x-Q. 40. Why, because you found that he had already accomplished the end which you had in view ?

A. That was the principal reason, yes. I think Mr. Easton sent Mr. Jones to me a short time before April, 1902.

(Signed) Victor H. Emerson.

Cross-examination closed.
Deposition closed.

539

Certificate waived.

540

541

Complainant's Exhibit I, Certificate of Incorporation [November 22, 1904, J. A. S., Examiner].

STATE OF WEST VIRGINIA

(Coat of Arms)

542 CERTIFICATE OF INCORPORATION.

I, Henry S. Walker, Secretary of State of the State of West Virginia, do hereby certify that an Agreement duly acknowledged and accompanied by the proper affidavits, has been this day delivered to me, which agreement is in the words and figures following :

The undersigned agree to become a corporation by the name of the American Graphophone Company for the purpose of acquiring and exercising the exclusive
543 right to manufacture, use and sell the patented invention known as the Graphophone and its parts and appliances within the United States and Canada, and of licensing others within said territory to make, sell and use the same, and to conduct such other rights and franchises as may be necessary or appropriate in connection therewith.

Which corporation shall keep its principal office or place of business at Washington City, District of Columbia, and is to expire on the thirteenth day of May
544 A. D. 1937. And for the purpose of forming the said corporation, we have subscribed the sum of sixty thousand dollars to the capital thereof, and have paid in on said subscriptions the sum of six thousand dollars ; and desire the privilege of increasing the said capital, by the sale of additional shares from time to time, to six hundred thousand dollars in all.

The capital so subscribed is divided into shares of ten (10) dollars each, which are held by the undersigned respectively, as follows, that is to say :

545

Names	Residence	No. of Shares.
By Jas. H. Saville	Washington, D. C.	1,200
By Jas. G. Payne	Washington, D. C.	200
By Austin Herr	Washington, D. C.	1,000
By Jas. O. Clephane	Washington, D. C.	1,000
By Jno. H. White	Washington, D. C.	1,000
By Andrew Devine	Washington, D. C.	1,000
By Nathaniel Wilson	Washington, D. C.	375
By Jno. F. Cox	Washington, D. C.	225
		6,000

546

And the capital to be hereafter sold is to be divided into shares of the like amount.

Given under our hands this thirteenth day of May, 1887.

JAMES H. SAVILLE 547
JAMES G. PAYNE
AUSTIN HERR
JAS. O. CLEPHANE
JNO. H. WHITE
ANDREW DEVINE
NATHANIEL WILSON
JOHN F. COX

WHEREFORE, The corporators named in the said Agreement and who have signed the same, and their successors and assigns, are hereby declared to be from this date until the Thirteenth day of May Nineteen Hundred and Thirty Seven a Corporation by the name and for the purposes set forth in said agreement. 548

{ Seal of West Va. } Given under my hand and the Great Seal of the said State, at the City of Charleston, this fifteenth day of May Eighteen Hundred and Eighty Seven.

HENRY S. WALKER,
Secretary of State.

593

Complainant's Exhibit 6, Abstract of Title, [Nov. 22, 1904. J. A. S., Examiner].

2-172

DEPARTMENT OF THE INTERIOR,

UNITED STATES (shield) PATENT OFFICE.

TO ALL PERSONS TO WHOM THESE PRESENTS SHALL COME, GREETING : 594

This is to certify That the annexed is a true copy from the Digest of this Office of all Assignments, Agreements, Licenses, Powers of Attorney, and other instruments of writing, found of record up to and including October 21, 1904, that may effect Letters Patent granted to Joseph W. Jones, New York, N. Y. Assor to himself and Joseph A. Vincent, Philadelphia, Pa. Patent 688,739, December 10, 1901. "Production of Sound-Records."

595

{ Seal of the United States Patent Office. } IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington this twenty-sixth day of October, in the year of our Lord one thousand nine hundred and four and of the Independence of the United States of America the one hundred and twenty-ninth.

F. I. ALLEN,
Commissioner of Patents. 596

Joseph W. Jones. 688,739.

Instrument dated Dec. 17, 97. Recorded Jan. 15, 98. Liber V 56, p. 408.

Parties.	*Invention.*
Joseph W. Jones, to Joseph W. Jones, Joseph A. Vincent, Philadelphia, Pa.	Process of Making Records for the Reproduction of Sound Waves. Filed Nov. 19, 97. Ser. No. 659,170. Pat. 688,739. Dec. 10, 1901.

597 To each one undivided half interest in said invention. Patent to issue to said assignees. Neither of the joint owners shall make, use or sell the invention or license others so to do without consent of the other.

Consideration $1.

Instrument dated Dec. 26, 1901. Recorded Dec. 27, 1901. Liber A 64, p. 494. 598

Parties.	*Invention.*
Joseph A. Vincent, to Joseph W. Jones, New York, N. Y.	Production of Sound Records. Filed Nov. 19, 1897. Ser. No. 659,170. Patented Dec. 10, 1901. 688,739.

The parties being joint owners of the entire right, Vincent hereby assigns all his right, title and interest in said invention and letters patent, and in all claims thereunder. 599

Consideration $5.

Instrument dated Feb. 25, 1903. Recorded April 11, 1903. Liber J 67, p. 146.

Parties.	*Invention.*
Joseph W. Jones, to 600 American Graphophone Company, a West Virginia Corporation, Washington, D. C.	Production of Sound Records. Dec. 10, 1901. 668,739, and other inventions of same Inventor.

Entire right, title and interest in patent 688,739, and in the inventions covered thereby and by said applications, and all claims and demands for profits or damages accrued or that may accrue from infringement (past, present or future). Patent on said applications to issue to said assignee.

$5 and other considerations.

601

Complainant's Exhibit 9, Defendant's Motion Proceedings [June 1, 1905, W. B. K., as Sp. Exr.].

UNITED STATES CIRCUIT COURT,

SOUTHERN DISTRICT OF NEW YORK.

602

AMERICAN GRAPHOPHONE COMPANY

vs.

AMERICAN RECORD COMPANY.

In Equity.
On Jones Patent
No. 688,739.

ELISHA K. CAMP, ESQ.,
Solicitor for Complainant.

603

SIR:—Please take notice that on the pleadings herein and the affidavit of Robert C. Cooley hereto annexed and copy whereof is served upon you herewith, and upon the pleadings and proceedings in American Graphophone Co. v. Universal Talking Machine Manufacturing Co., No. 8056, American Graphophone Co. v. Leeds & Catlin Co., No. 8570, and American Graphophone Co. v. Talkophone Co., all three causes now pending undetermined in the United States Circuit Court for the Southern District of New York, I shall 604 move this Honorable Court, at a term thereof for motions, to be held in the United States Court Rooms, Post Office Building, New York City, on May 19th, 1905, at the opening of the Court on that day or as soon thereafter as counsel can be heard, for

(1) An order apportioning the time for taking testimony in the above-entitled cause and requiring that proofs be completed prior to, and said cause placed on the calendar for hearing at the October 1905 term of this Court;

605

(2) An order that the final hearing in American Graphophone Co. v. Universal Talking Machine Manufacturing Co., No. 8056, be postponed until the October 1905 term of this Court; and

(3) An order granting to the defendant such other and further relief as to the Court may seem meet.

You are further notified that should said cause, American Graphopone Co. v. Universal Talking Machine Manufacturing Co., Equity No. 8056, be called 606 for hearing prior to the determination of this motion, application will be made to the Court, upon such call, and on the same showing as is now involved for the purpose of this motion, for the relief stated in section numbered (2) of the above notice.

Respectfully,

S. O. Edmonds,

Solicitor for Defendant.

New York, May 11th, 1905.

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609

UNITED STATES CIRCUIT COURT,

SOUTHERN DISTRICT OF NEW YORK.

AMERICAN GRAPHOPHONE COMPANY
vs.
AMERICAN RECORD COMPANY.

In Equity.
On Jones Patent
No. 688,739.

610

STATE OF MASSACHUSETTS, } ss:
County of Hampden, }

ROBERT C. COOLEY, being duly sworn, deposes and says as follows:—

I am of mature age, reside at Springfield, Massachusetts, and am Treasurer and one of the active man- 611
aging officials of the American Record Company, the defendant above named. Said Company is, and has been for some time past, engaged in the business of making and selling disk records for talking-machines. In the suit against said American Record Company, the bill of complaint was filed December 23, 1904, the answer was filed April 3, 1905, and issue joined by the filing of replication on May 1, 1905. Shortly after the filing of the bill, the defence of the suit was
placed in the hands of counsel and an investigation 612
made with a view to determining not only the standing of the Jones patent in suit but also its history with regard to litigation instituted by the patentee Jones and the American Graphophone Company as his successor to the title to that patent. This investigation developed not only a very complete disclosure of the prior art, amply sufficient, in my belief and in that of counsel, to invalidate the Jones patent, but also the following facts with regard to litigation in which said patent has heretofore been and now is involved.

613 *Universal (Victor) case*:—This suit is entitled American Graphophone Company vs. Universal Talking Machine Manufacturing Company, Equity No. 8056. The bill of complaint was filed in the name of Joseph W. Jones as complainant, in January, 1902. Thereafter issue was joined, as I am informed, but no testimony taken under that bill. On July 15th, 1903, a bill in the nature of a supplemental bill was filed by leave of the court, to bring in the successor (American 614 Graphophone Company) to the title to the Jones patent in suit. Thereafter issue was joined on the bill last named, testimony was taken, and the case is now on the equity calendar for final hearing. I shall presently refer more in detail to the proceedings in this case in support of defendant's prayer that the final hearing thereof be postponed.

Leeds & Catlin case:—In this suit entitled American Graphophone Company vs. Leeds & Catlin Company *et al.*, Equity No. 8570, the bill of complaint was filed 615 in October, 1903. Plea and answer were filed in the latter part of August or early in September, 1904, and, issue having been joined, proofs were taken in support of and in opposition to the plea, and the cause presented at final hearing on such proofs. As I am informed and believe, the cause is still pending undetermined.

Talkophone case:—In this suit, entitled American Graphophone Company vs. The Talkophone Company *et al.*, the bill of complaint was filed in January, 1905, 616 and I am informed and believe that the case is now at issue.

Proceedings in Universal Case:—Down to about a month ago, the American Record Company was ignorant of the fact that any litigation was pending between the American Graphophone Company and the Victor Talking Machine Company over the Jones patent, and supposed that, the Leeds & Catlin case having been balked by a plea, it, said American Record Company, had been selected by the Graphophone Company as the defendant against

617
which it proposed proceeding actively in the effort to sustain said patent. The fact that litigation was pending between said interests was developed quite accidentally, and only on Saturday last did I become to any substantial extent acquainted with the proceedings. These, briefly stated, are as follows :—

At the time the Universal suit was brought, the Jones patent stood in the name of Jones, and the Universal Talking Machine Company was (apparently at least) operating independently of the Victor Talk- 618
ing Machine Company but in the same general line. Some time after the suit was commenced, the Universal Company, as I am informed, was acquired by the Victor Talking Machine Company, which thereupon assumed the defence of the suit, such defence having been conducted by counsel who has heretofore and for a number of years past represented the Victor Company. Although the bill of complaint was filed in January, 1902, no testimony was taken until May, 1903,
when in a single day, so far as the record shows, the 619
prima facie testimony was introduced. The whole *prima facie* case comprises certain offers of exhibits and stipulations entered into April 9th, 1903, and an expert deposition introduced May 8th, 1903. At some time thereafter (just when I am unable to state, the defendant's record not being accessible to me and the same not having yet been filed), the defence proofs were introduced, consisting, as I am informed, of but three short depositions, one of a patent expert, another
of Emile Berliner, the inventor of the Gramophone, and 620
a third of an expert photographer. The complainant's rebuttal testimony was taken on March 30th and 31st, and April 7th and 8th, 1905, and comprises merely a rebuttal deposition of the expert who testified in the *prima facie* case and two short depositions of individuals connected with the complainant, American Graphophone Company. During the taking of the bulk of this testimony for the complainant, both *prima facie* and rebuttal, the defendant was not represented by counsel, the record showing that both the

621 *prima facie* expert deposition and the rebuttal expert deposition were proceeded with by complainant's counsel "In the absense of defendant's counsel pursuant to agreement." In neither the *prima facie* nor the rebuttal expert deposition, was the expert subjected to cross-examination.

Characterizing generally the proofs taken in behalf of both parties, I may say that the defense appears to come down almost wholly to the question as to
622 whether or not the Jones process involved invention in view of the prior (published) art. There is, it is true, a minor question as to infringement, based apparently upon the proper interpretation of the phraseology in a stipulation entered into between counsel with regard to defendant's operations, but this is of relatively minor importance, the only real and substantial question involved being apparently as to whether or not Jones's alleged achievement was anticipated by the disclosures in certain prior publications.

623 On Saturday last, for the first time, I learned that the Victor and Graphophone Companies are parties to an agreement, entered into some time ago but just when I am unable to state, bearing upon the litigation pending between them, and the burden of which agreement, as I am informed, is as follows:—The Victor Company is suing the Graphophone Company under Berliner patents Nos. 534,543 and 548,623. The Graphophone Company is suing the Victor Company (Universal
624 suit above referred to) under the Jones patent, upon which also is based the present suit against the American Record Company. The Victor Company agreed that if the Graphophone Company succeeds in sustaining the Jones patent, it, the Victor Company, (and I presume its allied interests) will take a license under that patent and pay royalties. The Graphophone Company agreed that if the Victor Company succeeds in sustaining the Berliner patents, it, the Graphophone Company, will take a license under said patents and pay royalties. So far as I am aware or can ascertain

625 there has been no offer or intent on the part of the Graphophone Company to make a similar arrangement with any of the other concerns defending against the Jones patent, the whole plan of the Graphophone Company involving, in my belief, the intent to sustain (or at least endeavor to sustain) the Jones patent in the suit against the Universal (Victor) Company, and if successful to then take in the Victor interests under license and utilize the Jones patent for the purpose of shutting out the other (and in some instances smaller) 626 concerns, such as the American Record Company, which is not interested in the talking *machine* business but confines its work solely to the manufacture and sale of sound records. I am informed and believe that the agreement between the Graphophone and Victor Companies has been made an exhibit in one of the suits now pending between these interests, but have been unable to find the same on record. I have had sufficient examination made to indicate that it is not a part of any record made up by the Graphophone Company 627 with which I am familiar, and believe that if it has been offered as an exhibit it was so offered in a record made up by the Victor Company and not yet filed.

I am familiar with the results of the investigation independently made at the instance of the America Record Company with regard to the validity of the Jones patent, and have had the testimony in the Universal (Victor) suit closely scrutinized by counsel with a view to determining whether the proofs in that 628 case are inclusive of the various matters of defence resulting from such investigation. It has been found that such proofs are not so inclusive, but that, on the contrary, there are other and very substantial defences against the Jones patent which apparently are not even foreshadowed by the proofs in the Universal (Victor) case. Thus, the showing of the prior state of the art as disclosed by publications prior to the application for the Jones patent is incomplete, our investigation having developed additional material,

629 which, in my belief and in that of counsel for the Record Company, constitutes substantial matter of defence and should, whether considered alone or in conjunction with the defence material introduced in the Universal (Victor) case, result in invalidating the Jones patent. In addition to this, we have discovered what I believe should amount to an absolutely conclusive defence against the Jones patent, involving the question as to whether the alleged process of the Jones
630 patent (whether such process be an invention or not) was in fact developed by Jones or boldly purloined by him from a coworker in the same shop.

As to both these matters of defence, the American Record Company is naturally unwilling, unless required by the Court, to be more specific at the present time, since a more detailed statement of new and additional defences could only have the effect of placing counsel for complainant on guard as to matters which will be proved *in extenso* in the defendant's record
631 in the suit against my Company. I am, however, entirely willing to submit the matter privately to the Court, in order that it may be seen not only that there exist substantial defences against the Jones patent, which should be brought to the attention of the Court at the first hearing of a suit designed primarily to establish that patent, but also that these defences are wholly different from anything presented by the record made up in the Universal (Victor) case.

In closing this affidavit, and in view of the state-
632 ments herein contained as to agreement between the presumably hostile Graphophone and Victor Companies, I wish to say, in fairness to counsel for the Graphophone Company, that much of my information with regard to proceedings in case No. 8056 between the respective interests was obtained from them by counsel representing the American Record Company.

The application to postpone the hearing of the Universal (Victor) case until the October term is based upon the assumption that the suit having now been pending more than three years, although not more than

633 ten days have been consumed by both sides in the introduction of testimony, a further delay until the October term cannot injuriously affect the Graphophone Company, particularly since the real defendant, the Victor Talking Machine Company, is a large and financially responsible concern, quite equal in this regard to the American Graphophone Company, having, as the testimony in one of the suits on the Berliner patents shows, about four millions of dollars invested in its business, and paying, as such testimony also 634 shows, a "regular dividend of six per cent. per annum" on its stock. The testimony in the suit against the American Record Company can with great ease be introduced in ample time to place the case on the calendar for hearing at the October term, when both suits can be presented together and the Court aided by the presentation of practically every defence which can be introduced against the Jones patent. So far as the American Record Company is concerned, it is more than willing to cooperate with counsel for the Graphophone Company to the end that the testimony in the 635 case against it may be speedily introduced and the case closed in ample time to permit the preparation of briefs in advance of the call of the October calendar.

ROBERT C. COOLEY.

Subscribed and sworn to before me, this 10th day of May, 1905.

WENDELL G. BROWNSON,
Notary Public. 636

637

IN THE CIRCUIT COURT OF THE UNITED STATES

FOR THE SOUTHERN DISTRICT OF NEW YORK.

AMERICAN GRAPHOPHONE COMPANY vs. AMERICAN RECORD COMPANY.	In Equity No. 8939.

638

Mauro Affidavit.

STATE OF NEW YORK, }
County of New York, } ss :

639

PHILIP MAURO, being duly sworn, says :

I am senior counsel for complainant in the above-entitled case. I have read the affidavit of Mr. Cooley verified May 10, 1905.

Mr. Cooley is a lawyer by profession, as he informed me in the one interview I had with him. This was in the latter part of the year 1904, prior to the filing of the bill of complaint herein. He had previously had an interview with my partner, Mr. Massie, and sub-
640 mitted to him a proposition for a license under the patent in suit, and also had been introduced (at his request) to Mr. Easton, the President of the Complainant Company, whose affidavit I cannot now obtain because he is in Europe.

Mr. Cooley desired to see me also with reference to this matter, and his request was granted. His statement was, in substance, as follows : that he and his associates had organized the American Record Company and were possessed of great financial and other potency, that they had examined the Jones patent

641 and realized that, if valid, it would interfere with their operations, but that they had, however, discovered an absolute and conclusive defense, the effectiveness of which was beyond all possible doubt or question. On the basis of these statements Mr. Cooley requested that the American Graphophone Company should grant a license to his Company under the patent in suit without further consideration than that his Company would refrain from destroying the patent. I assured Mr. Cooley that if the patent in suit was void, 642 my company did not wish to enforce it against him or against any one, and asked him what the facts were which established its invalidity. He replied that he did not wish to disclose these facts at that time. I asked him if he seriously expected the owner of a patent to be frightened into granting a license by the mere statemant, unsupported by proof that the would-be licensee had it in his power to destroy the patent. He replied that the facts to which he referred were of such a nature that he was assured that I already knew 643 of them and supposed that the mere indication that he knew them also would be all that was necessary to secure for his Company immunity from suit. The plain intimation was that I knew facts which rendered the patent invalid, and nevertheless was seeking to enforce it. I pointed out to Mr. Cooley that he could certainly not be prejudiced by disclosing to me facts which he took for granted were already in my knowledge, and again requested him to tell me what his sure defense was. This, however, he declined to do and de- 644 parted.

On April 27th or 28th, 1905, while I was in New York, Mr. S. O. Edmonds, counsel for defendant, called on me and spoke of the case against the Universal Talking Machine Co., saying that he had applied to defendant's counsel, Mr. Pettit, for a copy of the record but had not been able to obtain it. I told him that the record was not yet in print, but gave him the galley proof of complainant's record which had just come in from the printer; and at that

645 interview, and at a subsequent one in Washington, gave him freely all the information he asked, and more. I further told him that I would facilitate in every possible way his getting a hearing in the Universal case; or his presentation of any defense (if he had any) which was not yet introduced in that case; but that I would not under any circumstances consent to a postponement of the hearing. I reminded him of the consequences of connecting himself and his client with that
646 case, and also of the fact that, if he had a meritorious defense not presented therein, his client was secure against a preliminary injunction, which is the only possible prejudice he could apprehend.

I also voluntarily informed him of the agreement between the American Graphophone Company and the Victor Talking Machine Company, which is undoubtedly the basis of Mr. Cooley's statements, beginning on the bottom of page 4 of his affidavit. In the same breath, however, I told Mr. Edmonds that there was
647 no agreement whatever with the Universal Talking Machine Company. Nevertheless, Mr. Cooley gives it as part of his information that "the Graphophone Company is suing the Victor Company (Universal suit above referred to) under the Jones patent" etc., and that if it prevails "the Victor Company (and I presume its allied interests) will take a license under the patent and pay royalties". This "information" was not obtained from me, and is not true. Moreover, Mr. Edmonds who supplied Mr. Cooley's information
648 knows this, if he believes my statement, for I told him that the Universal Co. is in exactly the same position as the American Record Co.

With reference to the proceedings in the suit against the Universal Co., the facts are as follows:

The bill was filed March 19, 1902, and was delayed by demurrer which was finally withdrawn and Answer filed in January, 1903. Meanwhile, I had secured an injunction against defendant on the Bell & Tainter patent, so that there was no reason to press this suit with vigor. Nevertheless, testimony was begun in May, 649 1903. About that time there was a change in title (Jones assigning to the Graphophone Co.) necessitating a new bill which was filed July 15, 1905, and the case was thereupon at issue again in November, 1903.

It is a fact that, thereafter, defendants' counsel delayed the progress of the case, and I was unable to induce him to cross-examine our expert until I procured a Court order in February, 1905, limiting and apportioning the time.

The defense in this case (the Universal) is, in my 650 opinion, exhaustive, and is in very competent hands. I am very familiar with this art, and with the history of this particular invention, and I know of nothing which could possibly aid the defense and which has not been presented. I believe that if the American Record Company has any matters of defense not included therein, they will be found to be merely cumulative. The Universal Talking Machine Company is in precisely the same position with respect to the patent in suit and has precisely the same interest to defend 651 against it as the American Record Company. The Universal Company, like the American Record Company, has applied for a license under this patent in case it is sustained, and its request, like that of the American Record Company, has been refused.

The motion for an order limiting the time for testimony herein was unnecessary, as I told Mr. Edmonds he could have any arrangement he wanted with reference to proceeding with that case.

(Signed) Philip Mauro. 652

Subscribed and sworn to be-
fore me, this 17th day of
May, 1905.

(Signed) Elisha K. Camp,
[Seal.] Notary Public,
New York County.

653

IN THE CIRCUIT COURT OF THE UNITED STATES

FOR THE SOUTHERN DISTRICT OF NEW YORK.

654

AMERICAN GRAPHOPHONE COMPANY, vs. AMERICAN RECORD COMPANY.	In Equity No. 8939.

Massie Affidavit.

STATE OF NEW YORK, } ss.:
County of New York, }

655

C. A. L. MASSIE, being duly sworn, deposes and says: I am of counsel for the American Graphophone Company, complainant herein. On or about Dec. 17, 1904, I received a visit from Robert C. Cooley, Esq., of Springfield, Mass., representing the American Record Company, defendant herein. Mr. Cooley began by making strong representations as to the financial standing of the persons composing the American Record Company; and said that for a year past, they
656 had been investigating the patent situation, and had obtained evidence which they had laid before several patent attorneys in various parts of the country who had been recommended to them as being specialists in the talking-machine line; and that each one of these experts has rendered an emphatic opinion that, upon the evidence submitted, the Jones patent here in suit (and the Macdonald Graphophone Grand patent, likewise owned by complainant) could not be sustained. Mr. Cooley further stated that there was one absolute defense against the Jones patent that

657 they had knowledge of, but he believed it was not known to any one else. He further said that the American Record Company did not wish to break the Jones patent, and assumed that the American Graphophone Company had the same wish. Therefore, Mr. Cooley suggested that a perpetual license under the Jones patent (and the Macdonald Graphophone Grand patent) should be granted to the American Record Company. The latter, in turn, to make use of its good offices in reconciling the three different interests in 658 this line, to wit, the American Graphophone Company, the Victor Talking Machine Company, and the American Record Company. He declined to disclose what the evidence was upon which he relied.

I told him that the question of license was a matter for the American Graphophone Company itself to pass upon, and thereupon carried him to Mr. Easton, president of complainant. I was present during the interview between Messrs. Easton and Cooley, and Mr. Cooley practically repeated to Mr. Easton what he 659 had said to me. We tried to get from Mr. Cooley a statement of what consideration the American Graphophone Company would receive in return for granting a license to the American Record Company, and likewise requested him to submit to us the "evidence" he relied on or the reports of the various patent experts referred to by him. As to the former, he said the American Record Company would refrain from breaking our patent upon evidence which was known to no one but themselves and was altogether in their con- 660 trol; and further that the financial standing, etc., of the interests composing the American Record Company would be able to harmonize in some manner the American Graphophone Company, the Victor Talking Machine Company, and the American Record Company, to enable these three concerns to present a solid front against all other competitors. He declined, however, to produce or disclose the "evidence" referred to.

Some days subsequent, Mr. Cooley called again and

661 had an interview at my office with Philip Mauro, Esq., senior counsel for complainant herein. I was present during a part of this interview and did not pay particular attention to it; but what I heard was practically along the same lines as above set forth.

(Signed) C. A. L. MASSIE.

Subscribed and sworn to before me, this 17th day of May, 1905.

662 (Signed) WILLIAM E. HILLS,
[SEAL.] Notary Public,
New York County.

UNITED STATES CIRCUIT COURT,

SOUTHERN DISTRICT OF NEW YORK.

663 SUIT ON JONES PATENT, No. 688,739.

AMERICAN GRAPHOPHONE COMPANY,
Complainant,
vs.
AMERICAN RECORD COMPANY,
Defendant.
} In Equity.

664

Affidavit of Horace Pettit,

Re Motion of American Record Company.

COMMONWEALTH OF PENNSYLVANIA, } ss
City and County of Philadelphia.

HORACE PETTIT, being duly affirmed according to law, deposes and says as follows:—

I am counsel for the Universal Talking Machine Manufacturing Company, the defendant in the suit of

665

the American Graphophone Company vs. Universal Talking Machine Manufacturing Company, which is a suit in this court on the Jones patent, No. 688,739, for alleged infringement, and which is on the present calendar for final hearing at this Term of Court.

I have had entire charge of the last mentioned case on behalf of the defendant, during the taking and since the taking of complainant's *prima facie* proofs, since the supplemental bill, bringing in the American Graphophone Company, as complainant, was filed. 666
The Answer to the supplemental bill, as well as the original Answer, on behalf of the defendant, was filed by Messrs. Wetmore & Jenner, representing the defendant.

I have read the affidavit of Robert C. Cooley, presented in support of the motion of the American Record Company, verified May 10, 1905.

I wish, by this affidavit, to emphatically deny that the Universal Talking Machine Manufacturing Company, in its defense, is indifferent to the result of the 667
suit against it, and to deny that it has intentionally left any stone unturned in the preparation and presentation of its defence.

The affidavit of Mr. Cooley most strongly intimates, if not expressly states, that the Universal Talking Machine Manufacturing Company is indifferent to the result of the case, and has not presented all the defences which could be presented. He states, among other things, that—

668

> " During the taking of the bulk of this testimony for the complainant, both *prima facie* and rebuttal, the defendant was not represented by counsel, the record showing that both the *prima facie* expert deposition and rebuttal deposition were proceeded with by complainant's counsel 'in the absence of defendant's counsel, pursuant to agreement.' In neither *prima facie* nor the rebuttal expert deposition was the expert subjected to cross-examination."

669 I would say that the only deposition orally presented by the complainant in its *prima facie* case in the suit against the Universal Company, was that of Mr. S. T. Cameron, complainant's expert. No advantage could have accrued to the defendant by attending the taking down of Mr. Cameron's deposition, and the customary practice of not attending the taking of the complainant's expert deposition was followed in this case. No cross-examination was made, for the reason

670 that in the judgment of defendant's counsel none was required, and that it was to the best interest of the defendant not to cross-examine this expert witness. This is also true of Mr. Cameron's rebuttal testimony. Mr. Cooley says nothing about the cross-examination of complainant's other witnesses, as the record clearly shows that complainant's remaining witnesses, Mr. G. A. Manwaring and Mr. V. H. Emerson, were both subjected by this deponent to quite a lengthy and rigid cross-examination.

671 The deposition of Mr. George K. Cheney, taken in the case of the Universal Company vs. American Graphophone Company, and the affidavits of Mr. George K. Cheney, of June 18, 1892, and July 18, 1892, taken in another suit, were stipulated into complainant's *prima facie* proofs in this Universal suit, for the reason that counsel for defendant saw no objection to their being stipulated in; they related particularly to what the defendant had been doing, and the stipulation in no way prejudiced the interests of

672 the defendant.

The defendant and this deponent, believing the Jones patent was invalid, have, as this deponent believes, clearly proven the same, and this deponent, on behalf of the defendant, has been untiring in his efforts to present the fullest and most complete defence possible in the said suit, showing both the invalidity of the patent, as well as non-infringement.

This deponent knows of no other material evidence relative to the invalidity of the Jones patent, in suit, which he has not presented in his case.

673 On May 1905, Mr. S. O. Edmonds, counsel for the American Record Company, called at the office of this deponent, in Philadelphia, and this deponent gave him full and free access of complainant's complete record in this Universal case, before the record was printed, so that he might know exactly the nature of the record, and what defenses had been presented. This was with the understanding that if Mr. Edmonds, on behalf of the American Record Company had any additional material evidence, not in the 674 defendant's record in this Universal case, that he would give this deponent the benefit of the same. After Mr. Edmonds had examined the defendant's record in the Universal case, on that occasion, he stated to this deponent that he had no additional material evidence to give this deponent, and knew of no additional tangible positive evidence, unless some should be developed on lines not then investigated by him.

675 It makes no material difference to the Universal Company, or to this deponent, whether the Universal Company's case be heard at this time, or postponed until the fall, except the fact that a suit in which the defendant believes there is no merit will be hanging over it for a longer period of time, undecided, and the fact that a great deal of time has been spent by this deponent in the preparation of this case for argument at this Term of Court, at great expense to his client, and that to postpone it will mean re-preparation for argument about a half a year hence. 676

The agreement referred to in Mr. Cooley's affidavit is not an agreement with the Universal Talking Machine Manufacturing Company, but is an agreement between the American Graphophone Company and the Victor Talking Machine Company, which agreement has been offered in evidence by the complainants, the Victor Talking Machine Company and the United States Gramophone Company, in a suit brought by them against the American Graphophone Company on the Berliner patent, which case is on the present cal-

677 endar in this Court for final hearing at this Term of Court, and which agreement is open to the Court for inspection. It is printed in the complainant's record in that case.

(Sgd.) Horace Pettit.

Affirmed and subscribed to before me this 22d day of May, A. D. 1905.

(Sgd.) Alexander Park,
678 [Seal.] Notary Public,
Commission Expires Feb. 6, 1909.
604 Stephen Girard Bldg.,
Philadelphia.

At a Stated Term of the Circuit Court of the United States of America for the Southern District of New York, in the Second Circuit, held at the United States Court Rooms in the Borough of Manhattan, in the City of New York, on the 22nd day of May, in the year of our Lord one thousand nine hundred and five. 679

Present: The Honorable James P. Platt, Judge.

680 American Graphophone Company,
vs.
American Record Company.
In Equity.

This cause having come on to be heard on defendant's motion to postpone final hearing of American Graphophone Company v. Universal Talking Machine Manufacturing Company, Equity No. 8056, now after hearing S. O. Edmonds, Esq., in behalf of Defendant, and C. A. L. Massie, Esq., in behalf of Complainant,

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1. By inserting in paragraph XIII of said answer, after the words " residing at said Washington ", the following........ and Edward Wilson, formerly residing at said Washington and now deceased.

2. By inserting in paragraph XIV of said answer, after the list of names therein set forth, the following :—Edward Wilson, at Washington, D. C., and now deceased, and Joseph Sanders, of and at said Washington, D. C.

54

3. By inserting in paragraph XV of said answer, after the list of " Letters Patent of Great Britain " therein, the following—No. 12,593 of 1888, to George E. Gouraud, No. 1058 of 1889 to Charles Adams-Randall.

4. By inserting in paragraph XVI of said answer, after the words " Great Seal Patent Office, London, England ", therein, the following :—

The publication entitled " The Journal of the Franklin Institute " for December, 1895, pages 419 to 437, published by The Franklin Institute at Philadelphia, Pa., December, 1895. 55

The publication entitled " United States Circuit Court, District of New Jersey, In Equity, American Graphophone Company vs. The United States Phonograph Company * * * American Graphophone Company vs. Edison Phonograph Company," published in July, 1896, by McCrellish &. Quigley at Trenton, N. J.

American Record Company,
by its Solicitor,
56 S. O. Edmonds.

We hereby assent to the filing and entry of the foregoing amendment.

Elisha K. Camp,
Solicitor for Complainant.
S. O. Edmonds,
Solicitor for Defendant.

57

U. S. CIRCUIT COURT,

SOUTHERN DISTRICT OF NEW YORK.

AMERICAN GRAPHOPHONE CO.
v. } In Equity.
AMERICAN RECORD CO.

58

Testimony for defendant taken pursuant to notice at 908 G Street, N. W., Washington, D. C., before E. H. PARKINS, Notary Public, and Special Examiner by consent, on Wednesday, the 28th day of June, 1905, at 10 o'clock A. M.

Present:

MR. REEVE LEWIS, representing PHILIP MAURO, for complainant. 59

MR. S. O. EDMONDS, for defendant.

EMILE BERLINER, a witness called on behalf of defendant, having been duly sworn, in answer to interrogatories propounded to him by Mr. Edmonds deposes and says as follows:

Q. 1. What is your name, age, residence and occupation?

A. Emile Berliner; fifty-four; Washington, D. C.; Inventor.

Q. 2. You are here today in obedience to a subpœna, are you not? 60

A. I was served a subpœna yesterday commanding me to appear here as a witness in this suit.

Q. 3. You are the inventor of the talking machine known as a Gramophone and disclosed, for example, in United States patents Nos. 534,543 and 548,623, are you not?

A. I am.

Q. 4. Please state briefly what experience you have had in the talking machine or sound producing art, the field covered by your researches, &c.?

61 A. I used to be experimenter for the Bell Telephone Co. in Boston from the time that they started doing business and ever since I have been interested in machines dealing with sound phenomena and, particularly, the electrical transmission of speech and the mechanical recording and reproducing of speech. I have followed the development of talking machines from the time they first appeared and about 1887 began to experiment on the Gramophone, which I developed in that year and the year following, gave lectures and read papers before scientific societies in this country and in Europe on that subject, 62 and in 1894 the United States Gramophone Co., who are the licensees and owners of my Gramophone patents, began to sell machines and records in accordance with my inventions and the patents thereon. The business has developed ever since and is now one of large dimensions and, while I am at the present moment not specifically engaged in experimenting in that line, I have kept up my interest and followed the development of the art closely.

Q. 5. In 1887 and 1888, when you developed the Gramophone, were you familiar with the machine known as the 63 Graphophone and the patents of Bell and Tainter thereon, such as patents Nos. 341,242 and 341,288?

A. I was fully familiar with the Graphophone. Had studied its principles both by observation of the machine and of the patents and there was not a point of the invention with which I was not fully familiar. In fact, in a lecture delivered before the Franklin Institute on May 16, 1888, I gave due credit to the inventors of the Graphophone, Messrs. Bell and Tainter, and elaborated in such lecture on the principles involved in that invention. 64

Q. 6. I hand you a paper and ask you if this is a true copy of a paper read, or lecture delivered, by you before the Franklin Institute and reprinted in the Journal of the Franklin Institute for December, 1895?

A. This is a reprint from the Journal of the Franklin Institute furnished to me by the Franklin Institute soon after the lecture was delivered.

Q. 7. Do the illustrations and descriptive notes in this paper correctly disclose the apparatus used in connection with the Gramophone in and prior to the year 1895?

56

A. The illustrations and description thereof constitute a record of the best results attained up to that time by myself and my assistants.

Q. 8. And the apparatus so disclosed is the apparatus which was in use at that time by the United States Gramophone Co. under your supervision. Is that true ?

> By Mr. Lewis : The question is objected to as leading, and the same objection is made to all similarly suggestive questions. 66

A. The illustrations were made from the actual apparatus in use at that time by the Gramophone Co., with the exception, perhaps, of Fig. 4, which was not specifically used at that time.

Q. 9. Had the apparatus of Fig. 4 been previously used ?

A. It had been used frequently in the laboratory and, probably, for making some of the records, but in general the recorder of Figs. 1 and 2 was used.

67

> By Mr. Edmonds : Defendant's counsel offers in evidence the paper before the witness and the same is marked Defendant's Exhibit, Berliner Franklin Institute Lecture, December, 1895.

Q. 10. I find on page 14 of your lecture reference to the process of duplicating from an original record tablet, this process comprising the following steps : (1) forming a record upon a zinc plate coated with a resist ; (2) etching the record in the zinc tablet ; (3) pressing the zinc tablet into hard 68 rubber ; (4) pressing the hard rubber negative into wax ; (5) electro-depositing a matrix on the wax ; and (6) pressing such matrix into hard rubber. Have I correctly summarized the process stated on pages 14 and 15 of the paper ?

> By Mr. Lewis : The question is objected to as incompetent and as calling for secondary evidence, the paper speaking for itself as to what is therein described.

Raymond R. Wile Research Library

69 A. I think I should call attention to the omission in your summary, as well as in the description given in that lecture, of the black leading, or covering with graphite of the bees wax, but I find on the same page 14 the following sentence, referring to a different and somewhat modified process of duplicating:

> "This had been made by pressing the original in wax, and depositing copper on this wax mold, as is done in ordinary electrotyping".

70 I was addressing this lecture to scientific men who were fully versed in the technique of electrotyping and I did not think it necessary in speaking of depositing copper on wax to state that as a matter of course it had to be made conductive by brushing over it powdered graphite and thereby coating the bees wax with a conducting film, a process known for a great many years and practiced in thousands of electrotyping establishments in the United States and over the whole world.

Q. 11. My question was directed to a later point in the discussion of "Duplicating Processes." Starting, however, 71 with the first process, to which you refer in your last answer, I will ask you if you practiced that process for duplication of sound records, *i. e.* the process of pressing the original etched record in wax, then coating the surface of the wax with graphite, and then depositing copper on this wax mold?

A. The process embodied in your question is the simplest one for the purpose of duplicating a record which we practiced before we found a practical method for duplicating by means of a copper matrix, in pressing the same on hard rubber or similar material. 72 This process of directly duplicating by electrotyping was a very convenient one in the early days of the Gramophone and before the same had been put on the market, and in a lecture given before the Franklin Institute May 16, 1888, a duplicate made by that process was shown and reproduced.

Q. 12. Turning, now, to the process to which I referred in my former question, I quote from the lecture the following:

> "After further studying this over it was found that an etched zinc plate could be readily

> pressed into softened hard rubber under heat and great pressure, and that, on cooling, the rubber disk had retained all the lines and marks most minutely and represented a perfect hard rubber negative of the original etching. A hard rubber negative of this character was then impressed in very hard bees wax, and, on this, copper was deposited, thereby getting a good copper mold or matrix. This matrix was then nickel-plated and rubber copies were made from this under heat and pressure.” 73 74

Please state if you, or the United States Gramophone Co. under your supervision, practiced this process of duplication commercially and, if so, with what result?

A. I made in the laboratory of the United States Gramophone Co. a large number of matrices by this process and in 1894, when for the first time Gramophones and records were placed upon the market, at least several hundred records, being duplicates of original zinc records, were sold and these copies had been made by impressing a matrix formed in the way described in your question into hard rubber. 75

Q. 13. Are you able to produce one of these duplicate records?

A. I have here and now produce a record of a cornet, the number of the record being 202, which was made by that process about 1893 or '94.

> By Mr. Edmonds: Defendant's counsel offers the record in evidence and the same is marked Defendant's Exhibit, Berliner Record No. 1. 76

Q. 14. Were these duplicate records, including the one which you have just produced, practical commercial sound records for use on the Gramophone?

A. They were and would be today under the improved processes of electrotyping as in use now and which represent a great advance in the art of electrotyping over the art as it existed in 1893 or '94.

Q. 15. Please state briefly just what you mean by your last answer as to improvement in the art of electrotyping?

A. In 1893 and 1894 the wax used in electrotyping was-

77 rather soft and the reason why it was taken soft was that the pressure with which the metal to be duplicated was impressed on it was rather limited with the presses then in use. Soon afterwards more powerful electrotyping presses were invented and this enabled the electrotyper to use a much harder wax. The consequence was that the surface of the original matter to be duplicated was more accurately reproduced in the electrotype wax, greater pressure was applied and the wax was not subject to changes of temperature, 78 being in a hard state, whereas the previously used soft wax would soften under the heat of the electrotyper's rooms and, of course, not take such a fine surface as the harder wax subsequently used.

Q. 16. What, if any, relation is there between the matter covered by your last answer and the following, which I quote from your lecture of 1895:

> " Admirable, however, as this method would appear to be, there is a loss of surface and consequently of line work, whenever the wax became in the slightest 79 degree softened during the mechanical part of the process, and a more direct mode of matrix-making became desirable ? "

A. The hard rubber negative spoken of in the previous answer was, as stated, pressed into wax by an electrotyper and this process did not differ in any way from the ordinary way of electrotyping engravings or type. Consequently, the same differences which were observed by electrotypers in the reproducing or copying by electrotyping of 80 ordinary engravings were apparent in the Gramophone matrices thus produced and, consequently, the records made by these matrices did not have that fine finished, polished, appearance of the original zinc record and a loss of surface spoken of refers to this dull appearance on the surface.

Q. 17. Then your language as contained in the last quotation refers only, does it, to matter of appearance and not to matter of practicability of the duplicate record made by the process in question ?

A. It only refers to the appearance of such records. Naturally we were anxious to show as highly finished products as possible and as I noticed the difference in the appearance between the original zinc record and the copies made by the process described I naturally felt that something ought to be done to improve the appearance of the records. But they were commercially available because the sound produced by them was very satisfactory and pleasing to the public who bought them. 81

Q. 18. Turning, now, to the third duplicating process described in your lecture of 1895, I quote from page 15 of your lecture as follows: 82

> "It was while on a visit to Germany, that the problem was turned over to a very prominent electrotyping firm there, who succeeded, after a number of failures, in producing most accurate copper matrices by a direct deposition on zinc plates. Their method consists in covering the zinc with electrolytic brass; this is silvered and a copper shell is then deposited thereon, in a common sulphate of copper bath."

Please say whether or not this process succeeded, in the laboratory or factory of the United States Gramophone Co.,—the process referred to in the previous questions and answers, in which an intermediate hard rubber negative was employed? 83

A. Yes, this process of depositing electrolytic brass on zinc and then depositing a copper shell on this brass surface was for a time used and directly succeeded a former process of duplicating by hard rubber negative. Subsequently we found a simpler method which consisted in covering the zinc record with a very delicate layer of electrolytic copper just sufficient to protect the zinc from the sulphate of copper bath. On this copper was deposited in the usual manner and the shell detached from the original record. 84

Q. 19. And was such shell used for making the duplicates by the pressing process?

A. Precisely. These shells constituted the matrices for making a large number of copies in hard rubber or similar material.

Q. 20. So that the only departure from the process as stated in your lecture was the use of the thin film of electro-

85 lytic copper instead of the thin film of electrolytic brass. Is that correct ?

A. Yes, that is correct.

Q. 21. About when was it that you used the process in question (employing electrolytic copper) commercially ?

A. In 1895 we began to use matrices made by the process of depositing copper on zinc direct by the help of the previous copper coating.

Q. 22. Was this commercial process used by the Gramophone Co. from that time on ? 86

A. Yes, in general this was the process used as long as I had charge of this part of the processes for the Gramophone Co., until, I should say, the year 1898.

Q. 23. Were the duplicate records so made sold commercially ?

A. They were sold in large quantities. Many thousands at a time.

Q. 24. I show you two Gramophone records and ask you to state how they were made ?

87 A. The records you have handed me are numbered 177 and 451. The originals were made Mar. 28, 1895, and Apr. 11, 1895. These records were from the regular stock of the United States Gramophone Co. and they were made in the manner described last, by depositing a copper shell on zinc previously protected by a copper film. The shell was detached from the zinc record and used as a matrix for pressing copies into hard rubber and these two records before me were pressed from such matrices.

88 By Mr. Edmonds: Defendant's counsel offers in evidence the records before the witness and the same are marked Defendant's Exhibit, Berliner Record No. 2 and Defendant's Exhibit, Berliner Record No. 3.

Q. 25. Were the processes of duplication to which you have referred down to the present time generally known in and about the factory of the United States Gramophone Co. as a part of its work of exploiting the Gramophone and accessories ?

A. The work for the production of Gramophone records

89 for the Gramophone Co. was divided between Philadelphia and Washington. The Washington end was under my direct supervision and took care of the making of the original zinc records and of the making of the matrices. The latter were then sent to Philadelphia and they pressed records from the same. In the Washington laboratory there were employed a number of young men as assistants and everything was open to them, all experiments being made under their eyes, if any new experiments had to be made for the purpose of improving our methods, but the general public or even the directors of 90 the Gramophone Co. did not all know the precise methods in use at the Washington end.

Q. 26. You use the word laboratory, do you not, as synonymous with workshop and factory?

A. I use the word laboratory as indicating that part of the factory for the production of Gramophone records which embodied the more delicate chemical and electrochemical processes and I stuck to the word laboratory because before we put Gramophone records on the market it was a shop for testing of ideas similarly to the experimental laboratories or 91 chemists and other technical men working in electrochemistry.

Q. 27. You have referred in a previous answer to the presence of employes, helpers, &c., in your laboratory. Do you know Joseph W. Jones and was he one of these?

A. Joseph W. Jones was one of my assistants in the Washington laboratory for about a year or more.

Q. 28. To what extent was he familiar with the work done there and with your ideas, processes and accomplishments?

A. I made it a rule to freely discuss with my assistants 92 everything pertaining to the work of the laboratory. I took it for granted that they were young men of high moral character who could be trusted with trade secrets and I was anxious to train up a number of experts who, in case anything serious should happen to me, preventing me from supervising the work, could intelligently and independently attend to all the work for the Gramophone Co. I therefore trained them with care and a part of the training consisted in freely discussing with them the chemical and electro-chemical problems on which they worked to educate them into accurate

93 work, which was absolutely necessary for the purpose of getting the best results. Nothing was kept secret before them, and they had access to all the results of the work of previous years which had accumulated in the laboratory and were permitted to ask all questions regarding them, receiving courteous and complete answers from me and the older assistants.

Q. 29. In patent No. 688,739, granted to Joseph W. Jones, the following statement appears relative to the cutting or engraving method vertically undulatory and a cutting or
94 engraving method undulating laterally: "This cutting or engraving of a record groove by the lateral movement of the stylus differs from the operation of the well-known graphophone system in that the resistance offered the stylus of a graphophone in cutting downward to produce the vertical irregularities characteristic of that system varies practically as the cube of the length of the vibrations of the diaphragm and stylus, whereas in producing my original records the resistance encountered by my recording stylus is exactly equal to the length of the vibrations." Please say whether or not this
95 was a matter of common knowledge in and prior to the year 1896?

A. The principle involved in Jones's statement quoted was well-known by that time. I believe I was the first to call attention to that difficulty encountered in the making of phonograph records, and I would refer to page 10 of a reprint of a paper read before the Franklin Institute May 16, 1888, where this matter is dealt with. I quote from that page as follows:

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> " for what self-induction is to the telephone circuit the variable resistance which impressible material offers to indentation or engraving at various depths is to the phonograph record sheet. Neither is proportional in direct ratio to the expended energy and must give cause, aside from a reduction in size of the sound characters, also to a distortion of the same.
>
> "Your own Prof. Houston, in his learned remarks in the Journal of the Franklin Institute of January, 1888, says:
>
> " 'The difficulties just pointed out, it would seem,

97 must exist in any instrument, however improved in its mechanical structure, if it makes the record on the phonogram at right angles to the surface thereof. Of course, if a substance were discovered for such a surface that offered a resistance to indentation exactly proportional to the depth of such indentation the difficulty would, to a great extent, be removed.' "

Q. 20. Your 1895 lecture indicates that at that time you were familiar to a considerable extent with the art of electrotyping. 98 Can you state just what this art included with regard to the formation of a matrix from an original and the subsequent use of such a matrix?

A. The art of electrotyping did not originally refer to duplicating processes for making sound records, but dealt with the duplicating of type and engravings and, as a branch thereof, of photo-engravings. The process employed was generally the pressing into wax of type set up by the printer or of engravings of any kind in wood, steel, or copper, the making conductive of the wax so impressed by brushing over 99 it finely pulverized graphite and also bronze powder, cleaning the surface so black-leaded by further brushing or by washing under a stream of water, hanging such impressed wax molds into a bath of copper sulphate in which was also hung a plate of copper, forming the positive pole of an electric current, connecting the graphite surface of the wax mold with the negative pole of the electric current and thereby deposit copper on the graphite surface. After several hours or more a sufficiently solid copper shell had formed on the graphite which could then be detached, backed up with 100 type metal and then used for printing as ordinary type or as an original engraving.

The art of electrotyping also comprised the making of metallic duplicates of all kinds by a similar process, the duplicating of metals or coins, for instance, or objects of art, like statues, relief engravings, cameo engravings, and similar things.

It furthermore took in all the processes of electro-plating with gold, silver, nickel, etc., to the extent that they were demanded in the duplicating of type, engravings or art objects.

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To dwell on all the branches of this art would take a book and many works of reference are at hand to take note of the various modifications of the art of electrotyping.

Q. 31. Referring again to the specification of Jones's patent, I quote therefrom as follows:

> "This original record is then prepared for receiving the electro-plate deposit by coating its surface with an electric conducting medium—such, for instance, as carbon (graphite,) as commonly employed in the process of electro-plating, or, as a substitute, nitrate of silver. 102 This coated plate is then placed in an electro-plating bath, and a layer of metal (nickel, steel, &c.) is deposited upon it. The thin shell or matrix thus formed is then separated from the original record, which may be used repeatedly in the same manner to form other matrices. Owing to the flat shape of the original and of the matrix and to the fact that the sound groove of the former and the corresponding ridge of the latter do not lock the two are separated readily without the employment of 103 heat or of shrinkage, it being obvious that the repeated heating and resultant cooling are very injurious to the accuracy of the record. The matrix itself may be backed up with a supporting plate, such as brass or bronze cast upon (or sweated to) the reverse of the matrix."

Please state whether or not these steps in the Jones process as set forth in this quotation were matter of common knowledge in the art of electrotyping prior to 1895?

104 A. The processes here described by Jones were thoroughly known to every electrotyper or electroplater for many years before that time. I do not find a single statement which was not common knowledge to everybody skilled in the art of electrotyping.

Q. 32. You have referred to the practice of coating the surface of a non-conductor with a substance such as graphite to make such surface electrically conductive, and have indicated in your last answer that this step was a matter of common knowledge in the electrotyper's art. Was it also known prior to 1895 that where it was sought to electroplate a shell upon a

105 conductor an intermediate film must be employed in order to permit the shell and the (conductive) original to be readily separated?

A. This was thoroughly known and it can be found in every text book on electrotyping and electroplating in a variety of applications.

Q. 33. Referring in his specification to the process of duplicating cylindrical graphophone records by electrolysis Jones states that the "process is impracticable and unsuccessful" for the reason that "when the conducting material 106 (as plumbago) is deposited upon the vertical irregularities that are the very essence of this kind of record, it forms a covering that resembles on a minute scale a light fall of snow over a landscape. The sharp contours of the vertical irregularities are rounded (the more delicate and minute irregularities being filled in and completely obliterated) with a resulting mutilation of the record." From your knowledge of the art of electrotyping and of that particular step in the art involving rendering a non-conducting surface electrically conductive, are you able to say whether there is 107 any truth in this statement which I have quoted?

A. The results of black leading on a wax surface as described in the quotation might be obtained by intentionally disregarding the most common rules and practices in use in electrotyping. For instance, if graphite is not carefully brushed off, or if the first brushing is done with a hard brush which scrapes the wax, you might get just such results, but it would indicate a lack of ordinary knowledge and anybody the least skilled in the art, even an apprentice boy, would not be guilty of producing such results as described in that patent. 108 The statement is extraordinary, in my opinion, and any electrotyper reading it would smile that an applicant for a patent should be guilty of such misstatement due to lack of knowledge or intentional disregard of the truth as known in the electrotyper's shop.

Q. 34. Returning, now, to the subject of the duplicating processes used by you and the Gramophone Co., let me ask you, referring to the third process to which we have referred (direct electroplating), if the substitution of electrolytic copper for electrolytic brass as a coating for the zinc record prior to

109 its immersion in the electroplating bath was a vital matter to the performance of the duplicating process, or whether it was merely an improvement suggested by your work of duplicating by coating with electrolytic brass?

A. I should explain here that the depositing on the original zinc record of electrolytic brass or copper was only done for the purpose of protecting the zinc from the acid solutions afterwards used, namely, the sulphate of copper. If we had hung the zinc record directly into the ordinary sul-
110 phate of copper electrotype bath the sulphate would have attacked the zinc and distroyed the lines. Now, it would be entirely feasible to keep on depositing electrolytic brass or copper on zinc until a sufficient thickness of brass or copper was the result, which then would form the shell which we are after, forming the matrix of that record, but the process of depositing electrolytic brass or copper on zinc direct is very slow because a solution of copper or brass is used which has a very high electrical resistance, namely, a solution of cianide of copper or cianide of brass (copper and zinc). Con-
111 sequently such solutions are only used to cover zinc with a protecting film and not for the purpose of depositing a heavy shell. It is a question of saving of time, nothing else.

Q. 35. So that so far as the practicability of the process in question is concerned it is immaterial, is it, whether the protective film be of electrolytic brass or of electrolytic copper?

A. The results are the same, but we found it easier to control the deposit of a single metal like copper than of a compound metal like brass, and we therefore substituted the
112 copper film for the brass film.

Q. 36. Your duplicating process and the resultant duplicate record have been criticized in this case on the ground "that the groove etched in the metal plate by the acid was not an absolute copy of the line traced in the resist film by the sound waves", this being due to the fact that the acid "ate into the plate not only downward but sidewise." What are your views as to this criticism?

A. The criticism is not based on fact. It is true that the original tracing in the protecting film of the zinc plate was a very fine, delicate line, measuring, perhaps, not more than a

113 two thousandths or a five thousandths of an inch. The acid of the etching bath would attack the zinc in these traced fine lines and would gradually deepen the lines and also widen them, but the width of the line would not be greater than necessary for permitting a reproducing needle to travel in it. It should also be observed that if the waxy film which formed the protecting layer on the zinc broke down as the acid came under it eating the zinc and at the end of the etching no undercutting by the acid could be seen, even with a most powerful microscope. It was a line starting almost at right angles 114 with the surface and forming a perfect U-shaped groove in the zinc. Consequently the record groove resulting from an etched record made according to the best practice does not differ at all from a groove cut by a cutting tool in wax or any other material, unless the cutting tool was given a specific shape.

Q. 37. As a matter of fact was or was not the record groove formed in your zinc plate by the etching process a faithful reproduction of the original sound?

A. It was an absolutely faithful reproduction of the original tracing except that it was widened out sufficiently for a 115 reproducing stylus to travel in it.

Q. 38. Your process and the resulting record have also been claimed defective in that the "etched groove was not a true record of the sound sought to be recorded," this being due to the fact that the "metal was seldom absolutely homogeneous in character, the action of the acid was not perfectly uniform and the groove eaten into the metal would be filled with minute irregularities due to the uneven action of the acid, * * * the etching action of the acid left the entire surface of the groove in a roughly pebbled condition 116 dition". What have you to say to this?

A. This statement is on a par with the previous one dealing with the black leading of the wax surface. An unskilled man might produce such results as are described in the etching, but in practice and by a skilled operator the etched groove was very smooth indeed and the results in the reproduction of the sound from that groove showed that it had not such irregularities as have been described in the patent, because if such rough places existed at the bottom of the groove they would produce a very harsh and grating sound in the repro-

117 duction of the record. It is a fact that now and then under exceptionally unfavorable circumstances a record would be produced answering such a description, but of course it would be rejected as imperfect. There was no difficulty in making hundreds of records that were acceptable to the public and they were etched with such smoothness that they corresponded in appearance to an engraved record, such, for instance, as the graphophone people employ.

Q. 39. It has also been asserted that it was necessary, to
118 overcome this roughness of your record groove, to "run through the groove a blunt smoothing point or style", and that this acted to "mutilate the record" and cause it to depart from the true form of the line traced in the resist. What are your views on this point and, as a matter of fact, was such a smoothing point used for the purpose described?

A. After a zinc record had been etched and cleaned of the acid it was put on the reproducing machine for the purpose of trying it and seeing if the resultant sound presented the original sound spoken or sung or played into the sound col-
119 lector. Incidentally to this operation the reproducing stylus, the ordinary, nicely rounded, highly polished, steel point, would clean the bottom of the record groove which when it came out of the bath was discolored. This discoloration was in fact an oxide film which had nothing to do with the reproduction of the sound, nor interfered with it in any way whatsoever, but which formed a certain amount of electrical resistance in the next step of depositing copper thereon. Subsequently we found that this oxide film could easily be removed by washing the record in a weak alkaline solution
120 and when that had been done the record looked nice and smooth and white and clean. In exceptional cases, when, for instance, the record had been made which, due to unfortunate circumstances, was not etched smoothly, and when we had difficulty in getting the same speaker or singer or performer to repeat the recording, we endeavored to smooth the record groove by an engraving tool, but this was rarely done and never resulted in a satisfactory record, and while it was done a few times, probably just about the time when Mr. Jones was in our employ, it was never practiced after it had been found that it was a worthless operation.

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Q. 40. Complainant's expert has asserted (x-Q. 15) that "such great inventors and experts in the art of recording and reproducing sound as Emile Berliner, Dr. C. A. Bell, Prof. Sumner Tainter, Thomas A. Edison, and Thomas H. McDonald" did not regard it as practicable "to commercially reproduce sounds from a laterally undulating record formed in wax sufficiently soft to enable an accurate record to be properly engraved thereon". What have you to say to this assertion insofar as it concerns you?

A. I am at a loss to account for this assertion. I never for 122
a moment doubted that a satisfactory sound record could be cut laterally in wax or similar material. In fact I had tried it myself several times and appreciated the fact that it could be done successfully with the proper cutting stylus mounted similarly to a Gramophone recording stylus. I do not consider such a wax record commercial and the only way to utilize it would be to make a matrix of such a record in copper, for instance, and press that matrix into a hard material like hard rubber. It is, of course, entirely possible to reproduce
sound from a wax record having a laterally undulating groove 123
by a delicately mounted reproducing sound box similar to those used in the graphophone. In fact, several years ago a machine was placed on the market which utilized a wax record forming a laterally undulating groove for reproducing sounds therefrom by a delicately mounted stylus and such machines were sold, but they were extremely delicate, soon got out of order, and after a short period of existence the machine disappeared from the market. I never for a moment doubted that such a record in wax could be reproduced with a
sufficiently delicately mounted stylus and the statement that I 124
did not consider it commercial is true to that extent that I did not think a machine trying to reproduce such a laterally undulating record by the common public would be practicable.

Q. 41. Does your last answer express your mental attitude prior to, say, the year 1896?

A. I never had any other opinion on that subject and as wax records forming a laterally undulating groove had been before me years before that it was an old story in my mind in the year 1896.

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Q. 42. As a matter of fact there is not on the market to-day, is there, so far as you are aware, a sound reproducing machine in which the sound is reproduced from the record originally cut as distinguished from a record which is a duplicate of the original cut record?

A. There is not to my knowledge a machine on the market which utilizes an originally cut wax record forming a laterally undulating groove for the reproducing of sound.

Q. 43. I notice in your lecture of 1895 both reference to
126 the waxy film with which you coated your zinc tablets and also to the "cutting" of this film by means of the recorder. You might state in a word how that cutting operation was effected?

A. The film used in the etching process described in that paper of 1895 consisted of a deposition of bees wax from a solution consisting, usually, of benzine or gasoline into which bees wax was placed to be digested. It depended upon the density of this solution whether the film was thin or thick, but often when it was the thinnest employed by us it presented an appreciable thickness of a deposit of loose bees wax which
127 grew firmer as the solvent more thoroughly evaporated, so that after a day or two the wax was very consolidated, almost like a piece of wax cut from an undissolved piece. Now the stylus consisted of a true wedge-shaped cutter which had the advantage that it could be ground readily on a fine grindstone and you were sure of getting a nicely rounded cutting point with two sharp edges on the sides. It was in reality a cutting tool similar to that employed by Bell and Tainter in the graphophone. Of course I did not rely so much upon the cutting quality because usually the
128 film of wax was not thick enough to give us any trouble, but after the record had been traced there was a real groove visible in the wax film and if we had made this film thick enough there is no doubt but that after well drying the same we could have black leaded it and deposited copper thereon. But this was not our practice nor our intention. I only point out that we had an actual cutting stylus and we did employ such a stylus occasionally for cutting a record without an etching process in some hard material like lead. We also cut records direct in zinc, but the record so formed was not of a sufficient depth to be available for commercial record. The fact is,

however, that an actually cut record consisting of a laterally vibrating groove was constantly before our eyes and while we did not use it for reproduction or for direct depositing of metal thereon for the purpose of making a matrix, but used it only as a means for etching the records and protecting the sides of the record tracing, there was no novelty in my mind whatsoever and in some publication which I could find mention is made of the fact that the cut groove is nevertheless there. These observations began in the year 1887 and while we did
not follow up the idea of utilizing a cut groove directly for 130
reproduction the idea has ever since been entirely familiar to myself and my assistants in the laboratory.

Q. 44. Now please state in detail just what was done by you, or by others in your presence, from and after 1887 in the direction of cutting laterally directly in a resisting material as distinguished from tracing in a film and then etching?

A. The first time that the idea of cutting a laterally undulating record directly into hard or semi-hard material came before me was in an interference which was declared between
myself and one John H. White, in the United States Patent 131
Office in 1887. Mr. White in his application showed a laterally undulating record cut in wax and the interference was declared in connection therewith on the use of a stylus pivoted at right angles to the record surface in order to produce what I would call a Gramophone record cut in wax. The next time, it was one Malloney, an inventor here in Washington, who came to my laboratory in 1888 or '89 with a disk of some hard material covered with bees wax and he asked me whether I would not put it on my recording machine and cut a laterally
undulating record directly in the wax. This wax surface was, 132
I am sure, not less than a sixteenth of an inch thick and probably an eighth of an inch thick. We put it on my recording machine, I stiffened the stylus spring and we cut a record in his prepared wax tablet which when finished showed the vibration of the voice cut in solid bees wax. The groove was V-shaped and of even depth, zigzag, and presented what I would again call the Gramophone record groove cut in bees wax. This record groove did not go down to the backing plate but was of a depth similar to a Gramophone record, probably about one-four-hundredths of an inch deep. Mr.

133 Malloney asked me what I thought of the idea. I told him the idea was all right, but he could not use it because the Gramophone Co. only two years before had taken out patents covering broadly the method of cutting a sound record into wax or similar material, this being Bell and Tainter patents Nos. 341,214 and 341,288.

The next time this idea came before me was in the year
1890 while I was in Germany, when a gentleman by the name
of Rosenthal, living in Frankfort-on-the-Main, cut Gramo-
134 phone records into solid metal by means of a diamond cutting
stylus. In the following years and prior to the year 1894 oc-
casional tests were made with records cut into lead in my
laboratory and sound was produced therefrom. Such lead
plates were preserved for sometime and were burned up in a
fire which destroyed the workshop and laboratory of the
United States Gramophone Co. in 1897, in this city. In fact,
this whole matter of cutting a Gramophone record directly in
wax or other solid material was thoroughly familiar to all of
us, but on account of the very broad scope of the Bell and
135 Tainter patents no attempt was made to make such records
for commercial use, because we felt sure that the Bell and
Tainter patents would be sustained against them and as I had
interested outside capital in the Gramophone it was my aim
to steer clear of all legal entanglements as much as possible
and give them a free field in which to work.

Q. 45. Did you prior to 1894 also form a Gramophone
record (by which I understand you to mean a record groove
of appreciable and practically uniform depth and having lat-
eral undulations corresponding to sound waves) in any material
136 other than wax, lead and zinc ?

A. I recall that I cut some in asphaltum; also in hard rubber. These, I believe, comprise all the materials in which we attempted to and did make Gramophone records.

Q. 46. Will you please describe briefly the recording sound box used in these demonstrations ?

A. The recording sound boxes used on these occasions were practically those two types illustrated in the Franklin Institute paper of December, 1895.

Q. 47. At the time of these demonstrations did you or did you not have in mind that thing which you have re-

137 ferred to as a well-known feature of the electrotypers art which consisted in electro-depositing a matrix directly upon the cut record and subsequently using such matrix for impressing the record groove in the commercial record?

A. From the very beginning of the history of the Gramophone, as may be seen by referring to the very earliest publication in the "Electrical World" of November, 1887, I made mention of processes comprising the making of a matrix from a Gramophone record and duplicating thereby by pressing such a matrix into sealing wax, celluloid, rubber or sim- 138 ilar material. It made no difference in my mind how such record should be made, either by cutting direct or by etching. I had fully made up my mind that the only commercial development of the Gramophone would consist in just such a process of making a matrix by electrotyping on an ordinary record, no matter how made, and pressing that matrix in impressible material such as cited.

Q. 48. You have shown that one of your processes in the early nineties involved coating a wax tablet, having the record formed thereon, with graphite and then electro-depositing a 139 matrix upon such coated wax record. Do you mean that these particular steps, used by you in connection with the etched original, were fully appreciated by you for use in connection with the cut original to which you have referred?

A. Exactly. My mind at all times comprised into one system of commercially utilizing the Gramophone record all records which had a Gramophone groove, whether they were cut or whether they were formed by etching. The fact that I had had before me from the beginning Gramophone records cut in wax or other material would show to me the entire adapta- 140 bility of such a cut record to depositing a matrix thereon and pressing such a matrix in rubber or similar material. I never for a moment separated the two systems of making an original Gramophone record with reference to the duplicating of the same in the manner described.

Q. 49. Then, so far as concerns the process of forming the original by cutting or engraving a record groove therein by means of the lateral vibrations of a suitable stylus, such groove being of an appreciable and substantially uniform depth and having lateral undulations corresponding to the sound waves, 141 and then making such record, formed in suitable material, electrically conductive, then forming a matrix thereon by electrolysis, and, finally, separating the matrix and pressing the same into a tablet of suitable material, you were deferring this as a practice until the expiration of the Bell and Tainter patents. Am I correct as to this?

> By Mr. Lewis: Complainant's counsel feels called upon, unless his silence should be misconstrued, to reiterate his objection to the grossly suggestive and leading character of the questions that have been persistently asked by defendant's counsel. The objections are renewed and apply to all future questions of a similar character. 142

A. I cannot sufficiently emphasize this fact that in thoroughly recognizing the patents of Bell and Tainter, as taken out by able counsel of the American Graphophone Co., I felt that there was no use in following up a method of cutting a record in wax or other solid material, and 143 as these patents had a great many years to run I did not follow up this method of making Gramophone records. But I always thought that whenever the Bell and Tainter patents would expire that the art of cutting a Gramophone record in wax would be open to everybody and that the only patents standing in the way were the original Gramophone patents which would expire only a few years after the Bell and Tainter patents had expired.

Q. 50. In the practice of your etching process, Mr. Berliner, did your recording stylus remove the waxy material on the surface of the zinc plate? 144

A. It would sometimes do this and sometimes simply push the material aside. It depended upon the condition of the stylus. If the latter did not have a nicely rounded point (this expression "rounded" is to be taken comparatively inasmuch as under a strong magnifying glass there was no real sharp point at the end of the stylus touching the film on the zinc plate) it might scrape the waxy film and we would notice a thread of the same on the surface of the record disk after the operation of recording was finished. If, however, the point was thin enough it would simply push the wax film aside and in that case there was no removing of a thread of wax from the layer. It was always intended, for an etched film, that the waxy film should be pushed aside. 145

Q. 51. Did you find in any of this work a tendency of the recording point to cut the surface of the zinc plate where such point bore too strongly through the film of wax and on the surface of that plate?

A. If the recording stylus point was made of very hard iridium or of a diamond it would cut into the zinc. Otherwise, we would only notice a slightly indented groove in 146 the zinc if we did not etch the record and simply removed the waxy film from the surface of the zinc.

Q. 52. I call your attention to the flat tablet of wax or wax-like material shown in the Bell and Tainter patent No. 341,214, and also to the cutting stylus shown in Figs. 5 and 6 of that patent, and ask you to state, first, if those styles are, in your belief, cutting styles?

A. Yes, the styles shown in Figs. 5 and 6 of said patent are undoubtedly true cutting styles.

Q. 53. Will you now say what would have resulted had the 147 flat wax tablet of the Bell and Tainter patent been employed in connection with the recording sound box commonly used by you on the Gramophone prior to 1896?

A. If we had taken a Bell and Tainter waxed disk such as described in said patent, placed it on our recording machine, brought our recording stylus to bear with a slight pressure upon this wax disk and made a record in the same manner as we made the etched record, the result would have been a Gramophone record such as is described in the Jones patent, and if we had stiffened the stylus spring of our recording sound 148 box we would have gotten a record in wax commercially available for making a matrix thereof by depositing copper on the wax and pressing the matrix so obtained into rubber or similar material. By examining the illustrations in the Franklin Institute paper of December, 1895, it will be seen that we used a true cutting stylus in our recording sound box which in shape did not differ materially from the one employed by the Graphophone Co. in making their cut wax phonograph records.

Q. 54. Let me call your attention for a moment to Figs. 11 and 12 of British patent No. 12,593 of 1888. I ask you to ex-

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amine the same quite apart from the descriptive matter and to say whether or not, viewing these figures from the standpoint of a mechanician skilled in this art, those figures are, alone considered, sufficient disclosures to permit one skilled in the art to make and operate a recording sound box and recording substance coacting with the style of such a recording sound box?

A. Anybody who has ever worked in talking machines would immediately recognize in these two figures an apparatus
150 intended for either tracing or cutting a Gramophone record, meaning a groove consisting of a laterally undulating record of sound, on or into a record tablet. It is not clear without referring to the description whether the record line shown in Fig. 12 is a tracing or a cutting, but it refers to a Gramophone record recorded by means of a cutting stylus or, at least, it suggests that idea.

Q. 55. Can you by scanning the specification of the patent in question, but without taking the trouble to exhaust the same, say whether or not the apparatus shown in Figs. 11 and 12
151 includes a cutting or engraving stylus *b* rather than a tracing stylus?

A. The patent in question evidently refers to improved apparatus for making graphophone records in wax or similar material. It then mentions and describes Figs. 11 and 12, which form a modification of the inventor's system of mounting and shaping a mounting stylus as adapted to the making of a Gramophone record, that is a laterally undulating record groove.

Q. 56. In a word, do you find the disclosure of that
152 patent sufficient with respect to the figures in question to enable one skilled in the art to make and operate the apparatus shown in Figs. 11 and 12 to produce the laterally undulating groove of the form characterizing the Gramophone?

A. These figures suggest positively the making of a Gramophone record in wax by cutting the same directly.

Q. 57. Am I correct in understanding that one of the characteristically notable departures of the Gramophone apparatus from the graphophone apparatus resides in the use of a recording stylus so secured to the diaphragm as that its point operated in the plane of the recording material?

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A. The radical difference between a graphophone and a Gramophone lies in the fact that the former makes a record at right angles to the record surface, while the latter makes such a record parallel to the record surface, and the principles involved in these two operations have been pointed out in a previous answer and have been referred to in papers and lectures spoken of in this examination.

Q. 58. It appears, Mr. Berliner, that during the prosecution of the application for the Jones patent in suit, that application was placed in interference with an application filed in your 154 name and that after the interference was declared you declined to contest the issue of priority and permitted judgment to be entered on the record. Have you any desire to refer to this matter in this deposition? If so, please do so.

A. I might state that about the time when I filed my application for patent, which was subsequently placed in interference with the Jones application for patent, that I had heard that Gramophone records had been cut in wax, matrices made from such records by depositing copper on such cut records and that these matrices had been pressed into hard 155 rubber. I felt in my own mind not only that such a process could not be employed at that time without infringing the Bell and Tainter patents but that, moreover, the whole combination of processes involved therein was not patentable, or that if such a patent should be issued that it could not be sustained in the courts. I had not, at the time I filed my application, studied the references which I had accumulated in my scrap-books, part of which are my own publications. I was anxious to protect the United States Gramophone Co., the owner of my patents, from any outside inventor and as I 156 thought that it might be possible that some outside inventor might attempt to obtain a patent for this invention, I resolved to go into the Patent Office myself with an application covering that process, because I felt that if a patent was obtainable that I was the one who was entitled to such a patent inasmuch as the whole subject-matter was a familiar one in my mind for years before. I succeeded in my purpose because the declaration of interference showed that Jones had applied for patent for that process. Subsequently I looked over my scrap-books and found so many references to steps in the

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157 direction of this process and references to patents which had been obtained for steps of this process that I became convinced that the patent should be refused by the Patent Office, that there was no novelty in the whole system of making sound records, and I was equally convinced that if a patent was granted that it could not be sustained by the courts. I therefore withdrew from the contest in the Patent Office, but I was surprised when I saw that the Patent Office actually did give Jones a patent apparently covering the process in question.

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CROSS-EXAMINATION BY MR. LEWIS:

x-Q. 59. Is the Jones application with which you were in interference the one on which the Jones patent in suit issued?

A. It certainly covers the same subject matter and claims as the one I was placed in interference with.

x-Q. 60. And although you say that prior to the filing of your application you felt convinced of the non-patentability of the subject-matter therein claimed, you nevertheless felt justified in making oath to the fact that to the best of your knowledge and belief the invention was new and useful? 159

> BY MR. EDMONDS: Defendant's counsel suggests that complainant's counsel may be assuming somewhat as to what the witness stated, it being the recollection of defendant's counsel that the witness asserted not that the subject-matter was not patentable, but that the subject-matter was not patentable to Jones. Opportunity is given to amend the question if complainant's counsel sees fit. 160

A. I considered the invention new and useful if it was patentable and if the Examiners of the Patent Office in their judgment thought that there was anything new in it I had to make oath to such an assertion *prima facie* as it was the prescribed oath and was the only method by which I could accomplish my purpose of finding out if anybody tried to get a patent for the process. It was not within my power to specify and change the prescribed oath in order to conform to the peculiar condition under which an inventor attempts to

161 take out a patent for something which he considers old and in all probability not patentable.

x-Q. 61. So that you thought that you were justified in making oath to the novelty of something which you believed to be old simply for the purpose of ascertaining whether or not anyone else had filed in the Patent Office an application for the same thing?

A. I thought it was my duty to prevent the coming out of a patent of doubtful validity. To be sure if the process as described in Jones's subsequent patent had been to my knowledge 162 in public use and was in my opinion absolutely unpatentable and without doubt in the possession of the public I should not have made oath that it was new and useful, but as there was a doubt on that question before the Patent Office, inasmuch as the Examiners have many times erred in granting patents for things which should never have been patented or passed through the Patent Office, I felt justified in making the oath, which I could not change in wording to suit the peculiar circumstances.

x-Q. 62. So at the time you made the oath it was your own 163 judgment, aside from questions of doubt that might arise in the minds of the Patent Office Examiners, that a patent should not be granted on the subject-matter described in your application?

A. I considered the process new so far as public use was concerned in its entirety. I did not consider it new from a technical and scientific standpoint. I did consider it useful no matter whether it was new or old.

x-Q. 63. Then at the time you made the oath, it was your opinion that the subject-matter claimed as invention 164 was known to others, as considered from a technical and scientific standpoint?

A. I did so consider it.

x-Q. 64. Nevertheless you made oath not only to the fact that the invention had not been in public use for more than two years prior to the application, but also that to the best of your knowledge and belief it had not been known to others prior to your invention thereof?

A. Certainly. I considered myself the first inventor of this combination and my oath was entirely justified on that

165 point, but I had my doubts and in fact did not think that the invention was really patentable under the law, that it contained a combination the novelty of which was certainly questionable from a patentable standpoint. I knew the combination of the process was new so far as the general public was concerned, but it was not new as a combination to the experts in the art.

x-Q. 65. So although you knew that it was not a new combination, so far as the knowledge of experts in the art was concerned (excluding, of course, your own knowledge), you
166 nevertheless felt justified in making the necessary oath for a patent application?

A. I felt that the Examiner in the Patent Office might have a different opinion as to its novelty from what I had and that under this doubt arising as between my conception of the novelty and that of the Examiner in the Patent Office that I did not go amiss in making oath under the rules of the Patent Office that I considered it new.

x-Q. 66. So that although in reality you considered it old you represented to the Patent Office that you
167 believed it to be new, being willing to accept a patent should the Examiner take a view contrary to your real opinion?

A. It was the only means I had for finding out whether my opinion as to the novelty of the invention was correct or not and I made oath for the purpose of testing that question, because there was no other way to find out and I felt that if the invention was new enough to be patentable that I was entitled to a patent therefor.

x-Q. 67. So you misrepresented under oath what you believed to be the real facts for the simple purpose of ascer-
168 taining the pendency of conflicting applications in the Patent Office?

A. I cannot admit any misrepresentation whatever. I have given my reasons sufficiently in the previous answers and I cannot add anything further to it.

x-Q. 68. You have stated that you had in your possession certain publications which convinced you of the absence of novelty and patentability of the subject-matter of your application; did you have these publications in mind at the time you signed and filed the application?

A. No, certainly not. The fact is that after I filed my ap-

169 plication I was much astonished to find so many references which convinced me that the subject-matter of my application had been practically published and these facts had escaped my memory. I was so immersed in the work of perfecting the Gramophone invention that I disengaged my mind of all other matter. I filed away a lot of papers for future reference but after I had filed them away I forgot about them and it was only when I searched these references and scraps that I found out how much had been published previous to the time of my application. I had 170 no clerk to keep me posted and refresh my memory from time to time and as the work of perfecting the Gramophone was a very tedious and serious one I could not have been expected to keep track of all the publications which had gone before and which I may have read in a hurry and which had not impressed themselves on my mind sufficiently to retain them for an indefinite period.

x-Q. 69. How soon after filing your application did you become fully acquainted with these prior disclosures of the subject-matter which you claimed? 171

A. I could not answer that question now. I do not recollect just when I searched my references for that purpose. In fact it is possible that I came across these references accidentally as has often been the case in my career as inventor when all at once I came across things which I even might have written myself and which had escaped my memory. In the multitude of ideas which pass through the mind of an original investigator it would be necessary to keep a clerk for the purpose of indexing these ideas continuously and have them on tap for reference, and have carefully organized scrap-books. 172 Neither of these precautions did I employ, unfortunately, and I have often regretted in recent years that I did not do this and apply for patents for a good many ideas which afterwards were patented by some of my former employes or by other investigators. I think a consideration of the life of any inventor deeply immersed in investigations of a new art will show ample evidence of just such occurrences, where an important scientific fact was borne out at one time or another, pushed aside under the stress of investigations of more immediate importance, and forgotten.

173 x-Q. 70. Did you call the attention of the Patent Office to the alleged anticipatory publication discovered by you subsequent to the filing of your application ?

A. The record of the interference will undoubtedly disclose that I either did or attempted to acquaint the Patent Office with the prior publication of the subject-matter. In fact I recollect distinctly that about that time I gave to the Examiner a complete list of all references with regard to talking machines which I had in my possession, because I was anxious that the 174 Patent Office should be cognizant of every step that had been published in the art of talking machines.

x-Q. 71. In this connection I call your attention to a letter entitled in the Berliner v. Jones interference which purports to have been signed by you under date of May 10, 1901, wherein you appear to have expressed your views as to the non-patentability of the subject-matter in question and call the Examiner's attention to several alleged anticipatory publications. Was it at this time and by this means that you called the Examiner's attention to your views on the subject ?

175 A. I believe that in the practice before the Patent Office in interferences it is permissible to cite a sufficient number of references to sustain one's motion for any action and that one is at liberty to cite further references in the course of the contest before the Patent Office. This statement filed May 10, 1901, is, I think, a case in question when a few references are presented to the Patent Office and indications made that others would follow. As I stated before I took the trouble of furnishing the Patent Office with a complete list of my references in my possession 176 on the whole art of talking machines and I am sure that an examination at the Examiner's room in the Patent Office will show that my list of references was received by them. In further answer to your question I should say that my letter of May 10, 1901, was one of the means employed by me to acquaint the Examiner with my views of the non-patentability of the invention in interference.

x-Q. 72. In what other manner did you acquaint him with those views ?

A. I did not do so personally, but an argument was made by my counsel, whom I had acquainted with my views and refer-

177 ences, and through him the Examiner was informed of further proofs of non-patentability, in my and my counsel's opinion, of the subject-matter.

x-Q. 73. This was done at about the date, May 10, 1901, of the communication to the Patent Office?

A. I could not say now.

x-Q. 74. Are you the Emile Berliner who gave a deposition on Apr. 14, 1905, in Philadelphia, in the case entitled American Graphophone Co. v. Universal Talking Machine Manufacturing Co, involving this same Jones patent? 178

A. I am.

x-Q. 75. You have referred to several publications of addresses made by you to the Franklin Institute, one in the year 1888 and one in the year 1895. What other addresses have you made and had published from time to time on this subject of the gramophone and the production of Gramophone or zigzag records?

A. I read a paper before the Electro-Technical Society in Berlin in the year 1890, I lectured before the Electrical Society in Frankfort, before the Technical 179 Society in Hanover, Germany, both in the years 1889 and 1890. I lectured before an audience in the Grand Army Hall here in Washington, I think, in 1889, although I am not quite sure of the year without examining my scrap-books. I read a paper before the Society of Electrical Engineers in New York some time in 1891 or '92. I was invited to speak on the Talking Machine subject before the Cosmos Club here in Washington a couple of years ago. I believe these are all the public addresses I made.

x-Q. 76. Which of these addresses were published? 180

A. The paper before the Electro-Technical Society in Berlin, the one before the Society of Electrical Engineers in New York. They are both printed. The others were not.

x-Q. 77. Were these two printed addresses published in periodicals or otherwise?

A. The one in Berlin was published in the Electro-Technische Zeitschrift, the one before the Society of Electrical Engineers in their Journal immediately after the delivery of this lecture.

181 x-Q. 78. Were all your lectures delivered from written notes?

A. No, they were not.

x-Q. 79. Have you in your possession or accessible the original notes or copies from which any of your lectures other than those which are printed were delivered?

A. I have a printed record of most of my lectures delivered, even those which I did not read from the papers, but which were subsequently reported in daily or scientific journals.

182 x-Q. 80. Please give the names and dates, as near as you can, of the papers or scientific journals in which the reports referred to in your last answer were made?

A. I could not give them now without referring to my scrap-books, but if you will apply at the Patent Office you may find the complete list of my printed references which I furnished the Examiner some years ago.

x-Q. 81. It is my understanding of your testimony that you are up to the present day fully acquainted with the methods used for making and duplicating commercial sound
183 records; what company was the first to place upon the market the lateral or zigzag record?

A. The United States Gramophone Co. was the first in this country.

x-Q. 82. And the work of this company in this line was commenced and continued for many years under your personal supervision?

A. Yes, sir.

x-Q. 83. And the United States Gramophone Co. was for sometime the only concern placing such records upon the
184 market; how long did it so continue?

A. The United States Gramophone Co. commenced to place on the market lateral zigzag records in the year 1894 and continued to do so until the latter part of 1895, when it gave a sole license to the Berliner Gramophone Co. of Philadelphia, for the purpose of continuing the business under a payment of royalties. The latter company did so, but soon afterwards turned the selling department over to the National Gramophone Co. of New York, retaining only the manufacturing to themselves. Sometime in 1899, I believe, the agreement between the Berliner Gramophone Co. and the National

Gramophone Co. was revoked and the patent rights subsequently fell into the hands of the Victor Talking Machine Co. of Camden, New Jersey, who are now doing business under the Berliner patents.

x-Q. 84. During this time that the right of manufacturing Gramophone records passed to the successors of the United States Gramophone Co., what, if any, other concerns placed upon the market lateral or zigzag records?

A. I may mention the Zonophone Co., the Universal Talking Machine Co., the American Graphophone Co., the American Record Co., and the Ohio Talking Machine Co. These are all that I now recall.

x-Q. 85. Please describe briefly and in the order in which they were used the successive methods that have been practiced for commercially producing duplicates of lateral or zigzag records?

A. I could not absolutely assert what precise methods were employed by these various companies who sold zigzag records because I have not had charge of the making of records for some years, but I am told, without, however, being able to prove it, that practically only two methods were employed, the one which is described in my patents of 1888 and 1895 and '96, and the other as described in the so-called Jones patent.

x-Q. 86. Up to the time you discontinued the supervision of the manufacture of lateral or zigzag records what were the methods successfully employed under your direction?

A, The question is practically answered by referring to my lecture before the Franklin Institute of 1895. This lecture contains the history of the development of the making of records for the American Gramophone Co. while I was in charge of making such records.

x-Q. 87. The several processes there described in succession are, as I understand, covered by your several patents on methods of producing sound records or duplicating the same?

A. No, not entirely, because the process of impressing a zinc record in hard rubber and from that negative developing a copper matrix by the electrotyping process was never patented. There are some steps in the practical development of matrices which were kept as trade secrets and also not patented, but, in general, my patent of 1895 covers the making of

189 duplicates from matrices which were developed from original records.

x-Q. 88. How long did the etching method, with its various modifications, continue to be exclusively used for the production of Gramophone or zigzag records?

A. I could not say definitely because after somebody else was placed in charge of making the records I did not supervise the making of records and I have not the slightest idea at what time, if at all, it was abandoned. I have never been in
190 the recording laboratory of the Victor Talking Machine Co., have not seen their recording machines, and have not witnessed the making of matrices and duplicates, so that it would be out of the question for me to answer your question.

x-Q. 89. When did you discontinue the supervision of record manufacture for the Gramophone companies?

A. In 1898.

x-Q. 90. And up to that time the etching method had been exclusively used?

A. Yes, commercially.

191 x-Q. 91. Do you not know as a matter of general information that the etching process is no longer used in the manufacture of lateral or zigzag records?

A. So I am told.

x-Q. 92. You also know as a matter of general information that all concerns now manufacturing such records employ the procedure set forth in the Jones patent?

A. I do not know any such thing.

x-Q. 93. And you are without information on this point?

A. No, I am told that some companies selling zigzag records
192 make them according to the description in the Jones patent, but I have never seen any of them make them, so I cannot speak from personal knowledge.

x-Q. 94. Prior to the giving of your testimony herein have you read and studied the deposition given for complainant by Mr. S. T. Cameron?

A. No, I do not recall having read that deposition.

Signature and Notary's certificate waived.

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Met pursuant to adjournment.

Present—Counsel as before:

JOSEPH SANDERS, a witness called on behalf of defendants, having been duly sworn, in answer to interrogatories propounded by Mr. Edmonds, says as follows:

Q. 1. What is your name, age, residence and occupation?

A. Joseph Sanders; manufacturer of talking machines and materials for them; age, twenty-eight; residence, Washington, 194 D. C., No. 1360 Kenyon Street.

Q. 2. Are you acquainted with Emile Berliner, and if you are, how long have you known him?

A. I am. I have known him about eighteen years.

Q. 3. Were you ever in the employ of Mr. Berliner and engaged in the talking machine business?

A. Yes.

Q. 4. During what time?

A. I was in Mr. Berliner's employ from about 1892; no, before that, 1890 to 1893, and again from the middle of 1896, 195 at that time it was in the Berliner Gramophone Company's name, although I was directly under Mr. Berliner, who was running the laboratory in Washington for them, until the laboratory was moved to Philadelphia, I believe 1898. In this time there was an intermission of about seven months, during which I was in the employ of a German Gramophone Company, and the Berliner Gramophone Company, Limited, of London. I set up the plants over there, matrix plants and record plants, and then returned to Philadelphia, to the Berliner Gramophone Company, where I stayed about nine 196 months. I was there until sometime in 1899, in fact, probably towards the end of 1899. Then I returned to Washington to Mr. Berliner's laboratory again, and in 1900 started the manufacturing end of the business for Mr. Berliner in Canada. Have been connected with that ever since. When the Company was formed up there which bought out Mr. Berliner, I became the Vice President, which I still am.

Q. 5. During the period you were in Mr. Berliner's employ in his Washington laboratory what, if anything, did you

197 have to do with the manufacture of sound records for the gramophone ?

A. Well, I did most of that branch at one time or another.

Q. 6. Do you mean to include in this the forming of the original record by tracing the lateral record groove in the wax film on the zinc plate ?

A. Yes, I did that, prepared the plates, &c.

Q. 7. And also the manufacture of the commercial sound records from these original etched records ?

198 A. Yes.

Q. 8. It has been testified in this case that one of the processes which Mr. Berliner used in the production of commercial sound records involved first the tracing of the lateral record groove in the fatty film on a zinc plate, then etching the lateral groove in the zinc plate, then depositing on the zinc plate a thin film of electrolytic copper, then depositing a matrix on the original zinc plate so coated, then separating the matrix and pressing the same into hard rubber to form the commercial duplicate record. Have you any knowledge that this 199 process was commercially employed in the Berliner laboratory for the production of commercial sound records ?

A. Yes, sir, used it regularly.

Q. 9. Were you directly and personally concerned in the practice of this process and in the production of the commercial sound records by means of this process ?

A. Yes, sir.

Q. 10. You have said that you returned to Mr. Berliner's employ in the summer of 1896, and continued there for some time thereafter. Prior to December, 1896, did you know of 200 any other method observed in the Berliner laboratory of forming the original sound record by means of the laterally vibrating stylus of the gramophone ?

A. Yes.

Q. 11. And if so what.

A. We did some cutting in metal. Of course all of the records made were to some extent cut into the zinc, that is the majority of them, but there were some of them that were not etched.

Q. 12. What was the metal used ?

A. Lead, and a mixture of lead. I also recollect one or two

201 of copper. Also some films on glass, which were waxy, of asphaltum in some instances. I mentioned asphaltum, but I do not recollect that any asphaltum was used before 1896.

Q. 13. Referring to the records made in the metals to which you referred, were the record grooves formed in these metals direct, and not through the fatty film ?

A. There was no fatty film used at all ; it was formed right into the polished metal.

Q. 14. And were sound records reproduced from these cut records ? 202

A. Yes, sir.

Q. 15. What was done with these records in the Berliner laboratory ?

A. They were reproduced, and also some matrices made.

Q. 16. How were the matrices made ?

A. Similar to the regular etched record. That is, a thin film deposited on them, and they were pressed into hard rubber with a roll, and later on a composition of hard rubber was used. We also used celluloid.

Q. 17. You are referring now as I understand you to the 203 period prior to December, 1896 ?

A. Yes, sir. Prior to my leaving, in fact. Some time in 1893 or 1894.

Q. 18. What eventually became of these cut records, do you know ?

A. Well, I do not know what actually became of them. A number of them went down in the fire which we had in the laboratory. It was in October of 1897.

Q. 19. Where were these original cut records kept during that interval ? 204

A. No special place. Some kept on the shelves, on the wall on nails.

Q. 20. Accessible to people in the laboratory ?

A. Yes, the laboratory was not very large. It was probably three times the size of this room. A few shelves, and nails on the wall on which these records were hung when not in use.

Q. 21. Was the matter of these cut records and duplicating thereof by electrolysis regarded as a secret ?

A. No, it was not. Of course we did not mention anything

205 to outsiders. It was nobody's business. In fact we had some of it done outside. At one time we were using as a laboratory an electrotyping establishment in the power house. Instead of saying laboratory, I should say that they were doing some of our work under the supervision of one or two of our men. That is, the people themselves did not do the actual work, our men usually did it. We were using their room and tanks and all their appliances.

Q. 22. Do you know Joseph W. Jones ?

206 A. Yes, sir, he was in the laboratory when I returned from Germany. Employed there learning all the processes.

Q. 23. You refer now to the time commencing with the summer of 1896, do you ?

A. Yes, sir. I had never met him before, but on returning met him in the laboratory.

Q. 24. Where was he engaged relatively to the place where these cut records, to which you have referred, were kept ?

A. He was working right in the room.

Q. 25. Were these cut records in plain sight ?

207 A. I saw them frequently, and never had occasion to hunt for them.

Q. 26. And was Jones also engaged upon the electrolytic work going on in the laboratory ?

A. Yes, sir, he was there to learn all the processes.

Q. 27. After having cut the lateral groove in the metallic plates and formed matrices thereon, and pressed these matrices into the hard rubber to form the commercial duplicate records, why did you not proceed with this work on a commercial scale rather than turn to the practice of duplicating the 208 etched records characteristic of the earlier type of gramophone ?

A. The result as a whole in the etched were better than those from cutting into metal. Then the Bell and Tainter patents prevented using the cutting process where a soft material was used.

Q. 28. State just what you mean by saying that the etched records were better ?

A. The metal offered considerable resistance to the stylus when cutting directly, much more than when the etching process was used, which amounted to nothing more than tracing.

The stylus in this case cut an extremely shallow groove, and had comparatively little resistance. It therefore vibrated freer, in fact, sometimes too freely. To avoid this we sharpened the stylus to a very sharp point, and thereby reduced the vibration on account of the greater resistance offered. When cutting directly into the metal this resistance became too great, and the only methods that we knew of to cut and not have too great a resistance were covered by the Bell and Tainter patents. 209

Q. 29. State just what method this is that you refer to? 210

A. I refer to the cutting in wax, and then making a matrix from this, and pressing the commercial records from the matrix, being our usual method. That is, I mean the pressing was our usual method at that time.

Cross-examination by Mr. Lewis:

x-Q. 30. I understand from your several last answers that the etching method was pursued by you in preference to the direct cutting in metal, for the reason that you obtained superior results by the etching? 211

A. Yes.

x-Q. 31. Please describe in detail the procedure which you say you followed in cutting a lateral record groove in a wax tablet, and using this record to produce a matrix?

A. The most common was to take a cast disc of wax, turning this true, and placing it on a recording machine, *i. e.*, the gramophone, placing the stylus of the recording sound box with sufficient pressure, or, when no spring was used, to proper depth, speaking into a horn 212 connected therewith while the machine was in operation, then taking the record voice, coating it with a conducting film, either plumbago, known as graphite, or silvering it, then depositing on this in an electrolytic bath until a coating sufficiently thick was obtained, then removing this copper matrix, turning it true and smooth on a lathe (I refer to the edge and back), and pressing it into the hard rubber or like composition. This was done about 1898, but we made some films on brass plates as early as 1893. I would like to modify that last part.

213 Instead of turning this disc, we used a shaving machine, as used by the electrotypers.

x-Q. 32. To make sure that I clearly understand you, I will ask you what your previous answer means as having been done in 1898 ?

A. I said the most common method, I believe I mentioned there.

x-Q. 33. Then, as I understand, it was the coating in wax which did not have the brass backing that was done in 214 1898?

A. Yes, sir.

x-Q. 34. You have stated that as early as 1893 a brass plate having a wax surface was sometimes employed; please explain in detail how this tablet was prepared, and the procedure followed in forming a groove therein ?

A. A brass plate with holes properly drilled and comparatively straight as a rule, turned true or straightened under a hydraulic press was coated with wax either by dipping the plate in a pot of molten wax, or, as most frequently done, 215 by leveling the brass plate on a table and pouring the hot wax on it, the brass usually having been slightly warmed to the temperature found best to prevent the wax from chilling. Sometimes also, the plate was placed in a pan to get a thicker coat of wax, and to prevent the wax from running away. The brass plate was then cleaned on the back, placed on a shaving machine, and the surface of the wax shaved off to get it of even thickness and comparatively smooth. The plate thus prepared was placed on a gramophone recording machine, and a record cut or traced therein, 216 as described before in the solid blank. The plate with the record on was then brushed over with a soft camelshair brush dipped into graphite, after which it was washed off and fine iron filings distributed over it. A solution of copper sulphate was then poured over it, and the whole mixed up and daubed with a fine camelshair brush. This was done a number of times until a fine copper film was obtained, after which it was hung in the bath, and a heavy copper deposit put on it, after which it was trued up in a lathe, and records pressed from it in hard rubber or celluloid.

x-Q. 35. How do you fix the date?

217

A. Because I went away. I went to Europe the end of 1893, and this was done before I left. It may have been done in 1892.

x-Q. 36. How thick a coating of wax was placed on the brass plate?

A. This varied, but I should say somewheres from one-thirty-second to an eighth of an inch.

x-Q. 37. My understanding is that you are still engaged in the commercial manufacture of sound records?

A. Yes, sir. 218

x-Q. 38. What was done with the records cut in the coated disc?

A. They were reproduced, as usual, either one or two. I know of them being reproduced directly from the wax, and then the matrix made as before described. Records pressed from that.

x-Q. 39. I understand you first met Mr. Jones in 1896. Is that correct?

A. Yes, sir.

x-Q. 40. Mr. Jones was at that time employed by Mr. Berliner? 219

A. Yes, sir. That is, I don't know whether he was employed by Mr. Berliner, or the Berliner Gramophone Company, but he was working in the laboratory there.

x-Q. 41. Where was the laboratory at that time?

A. In the power house of the Capital Traction Company, on 14th St., and Pennsylvania Avenue, Washington, D. C. That was one part of the laboratory, the other part being at 1410 Pennsylvania Avenue, northwest, within a half a block.

x-Q. 42. When were these laboratories established at these places? 220

A. They were established while I was in Europe. I cannot give the exact date. They were established between—I can give you approximately--between 1894 and my returning in 1896.

x-Q. 43. And Mr. Jones was not, as far as you know, employed by Mr. Berliner prior to the time you went to Europe?

A. He was not.

221 x-Q. 44. To what extent was the etching method being used in the manufacture of disc sound records, lateral groove?

A. To a great extent.

x-Q. 45. Has it been used to the exclusion of other processes?

A. It has at times, yes.

x-Q. 46. At what time?

A. Well, I can only speak from the laboratory of the Berliner Gramophone Co., and when I was with them it was used

222 exclusively by them.

x-Q. 47. About what year was this?

A. In 1897, I believe.

x-Q. 48. Was it succeeded by other processes?

A. Not by the Berliner Gramophone Co., though I believe a number of others are to-day using other processes.

x-Q. 49. What is the name of the Canadian Company of which you are vice president?

A. The Berliner Gramophone Company of Canada, Limited.

223

Adjourned until Friday, July 7, at 10:30 A. M.

July 7, 1905.

Met pursuant to adjournment.

Cross-examination resumed by Mr. Mauro.

224

x-Q. 50. When did Mr. Berliner begin to manufacture sound records for sale and commercial use?

A. Sometime in 1893 or 1894, that is when the pressed records were sold. I do not know whether any of the zinc were ever sold for that purpose.

x-Q. 51. According to your testimony you were not there in 1894?

A. No, sir, I was not, but I was in close touch with Mr. Berliner's work.

x-Q. 52. In what way?

225

A. By letter, as I was at that time in Germany in the telephone factory of Mr. Berliner's brother, who was more or less interested in the gramophone. I was also helping in some recording work of another brother of Mr. Berliner, who had taken this branch up in Germany.

x-Q. 53. While you were in Germany in 1894, did you hear by letter that Mr. Berliner had begun to manufacture sound records for sale?

A. I must have heard it by letter, as it was the only way we were communicating. I cannot positively state the date, 226 but it must have been in that time. I know it was just after I left.

x-Q. 54. Do you know what process was used for making the original of these pressed records?

A. The original was made by taking a polished zinc plate, coating it with a film of fatty substance, removing the fatty substance with a stylus of a recording sound box, placing the thus prepared plate in an acid bath, etching the groove, then coating this metal plate with a thin film of copper, depositing a heavier coat of copper 227 on this in an acid bath, separating the zinc record from this, and pressing the copper matrix into hard rubber, or such materials. Both hard rubber and composition was used, though possibly the earlier ones were exclusively hard rubber and celluloid. The pressing was done by heating the rubber and matrix under a hydraulic press, and the separation of the rubber from the matrix. By acid bath, I mean a copper sulphate bath.

x-Q. 55. I understand that while you were abroad between the years 1893 and 1896, you established the manufacture of 228 pressed sound records. Is that the case?

A. No, sir; that was in 1898 or 9, if I am not mistaken.

x-Q. 56. You were abroad twice, then?

A. Abroad twice.

x-Q. 57. You did not establish any record plants, then, during your first trip abroad, 1893 to 1896?

A. No, sir.

x-Q. 58. What process was used in the plants established abroad by you about 1898?

A. The etching process.

229 x-Q. 59. What was the process established by you in Canada?

(Mr. Edmonds: As you have no counsel present, Mr. Sanders, I advise you that in my belief the Court will protect you should you be asked to disclose any personal matter which you regard as a secret as to the processes used in your laboratory in Canada.)

230 A. I do not know that just at present I would care to answer that.

x-Q. 60. The method you used there is regarded as a personal secret, to some extent at least. Is that the case?

A. Yes.

x-Q. 61. Are you related to Mr. Berliner?

A. Yes, sir.

x-Q. 62. What is the relation?

A. He is my uncle.

x-Q. 63. Who did the actual record making in Mr. Berliner's laboratory before you left there about 1893? 231

A. It was done by Mr. Berliner and Mr. Edward Wilson. That was just before I left. Before that—I don't know his first name—by a German named Novack, and Mr. Werner Suess.

x-Q. 64. You were apparently about thirteen years of age when you first went into Mr. Berliner's laboratory?

A. Yes, sir, probably a little earlier.

x-Q. 65. You have stated that during the time Mr. Jones was employed there there were some records cut in metal hanging in sight in the laboratory. 232 I understand that these were the records which you say were made in 1893. Is that correct?

A. I can't say positively, as I do not recall the dates on the records.

x-Q. 66. They were metal records, were they?

A. Yes, sir.

x-Q. 67. How did you know that the sound record had been cut in them?

A. Because in these special records I was told so by those in the laboratory, though I had seen similar ones made.

233

x-Q. 68. Who told you so?

A. Either Mr. Jones or Mr. Springer, who was at that time in the laboratory.

x-Q. 69. The records were just hanging there, were they?

A. Some were hanging, some were lying, there were several there. One in particular I was positive had not been etched, because it was in lead, and we had never done any etching in lead. I might say further that when I speak of lead I mean a composition of lead, such as type metals, and so on.

x-Q. 70. In answer to cross-question 31 you say "We made 234 some films on brass plates as early as 1893." Who do you mean by "we?"

A. In the laboratory, Mr. Wilson, Mr. Berliner, and myself also Mr. Max Levy.

x-Q. 71. And what do you mean by films?

A. "Films" probably did not express it properly. I should have said, a coating, because it was thicker than a film. I think I stated yesterday it would vary after shaving from one-thirty-second sometimes as thick as one-eighth of an inch. It would be shaved several times, and the thickness would of 235 course vary.

x-Q. 72. Will you please read over carefully your answer, as it is reported, to cross question 34, and see if you wish to make any changes.

A. I can only suggest that the reference to preventing the wax from chilling should be that the brass was slightly warmed to the temperature found best to prevent the wax from chilling too rapidly, because when the plate was cold the first part of the molten wax striking it would chill, and the result was a coat consisting of stratas, so to speak, and not homogeneous. 236 For this reason we warmed the plate, and allowed it to cool together with the wax, before shaving; otherwise we would have to make the wax very thick to cause it to run and transmit sufficient heat to the plate to allow the first wax to melt. I might also correct "trued up in a lathe." It was turned up, and in these instances instead of the copper being made as heavy as "turned up on a lathe" might lead to believe, the copper was backed with type metal instead of a solid matrix made, as was frequently, and altogether later in the art, the custom.

237

x-Q. 73. From your answer to cross-question 35, I understand you mean to say that this operation described in answer to cross-question 34 was performed in Mr. Berliner's laboratory in or about 1893. Is that your testimony?

A. Yes, sir.

x-Q. 74. You were asked in direct examination, Questions 10 and 11, whether you knew of any method observed in the Berliner laboratory prior to 1896, other than the etching method. Why did you not, in answer to that question, men-
238 tion the operation described in cross-question 34?

A. Because I did not think of it until it was brought out by the cross examination of Mr. Lewis.

x-Q. 75. You had forgotten all about it up to that moment, had you?

A. Yes, sir. I could not place any dates on this until my thought struck on Mr. Wilson showing me these things, and not having worked with Mr. Wilson after that date of 1893, I placed the whole situation and conditions without trouble. In fact, the whole thing flashed through my mind very suddenly,
239 and I saw all the machinery and old laboratory right before me.

x-Q. 76. Referring to your answer to cross-question 31, you speak of an operation of making a zig-zag record in wax as being done about 1898. This is substantially the same operation as you mean to describe by your answer to cross-question 34, is it not?

A. Practically so.

x-Q. 77. The circumstance that this was done in 1898 had not escaped from your memory, had it?

240 A. No, sir, it was while describing this the other flashed through my mind.

RE-DIRECT EXAMINATION BY MR. EDMONDS.

Re-d. Q. 78. In the 1893 operation described in your answer to cross-question 34, who was it that arranged the plate, adjusted the machine, and generally did the mechanical work?

A. Mr. Edward Wilson, and Mr. Berliner was also doing a great deal of the mechanical work, and I did general helping.

Re-d. Q. 79. I was referring to the particular operation described in your answer to cross-question 34. 241

A. This particular one, Mr. Edward Wilson did.

Re-d. Q. 80. And you assisted him ?

A. Partly. I was going to school at that time near the laboratory, and came there after school, and Mr. Wilson was preparing this plate the first time that I remember when I came in.

Re-d. Q. 81. Were you present during the operation described in that answer ? 242

A. Most of it, and I was present several times afterwards when he tried the same method.

Re-d. Q. 82. What was the purpose of washing the plate after it had been coated with graphite ?

A. In hanging the plate in the bath directly it took considerably longer than the method of precipitating the copper on by washing with iron filings and blue stone, and to hasten the deposit we first put a thin film of copper on which gave a better contacting surface, as when graphite alone is used the copper deposit creeps over gradually. 243

Re-d. Q. 83. What do you mean by the words "cut or traced" in this answer ?

A. Well, removing the wax from the disc where the stylus cut or traced. I mentioned cut or traced, because it was difficult sometimes to discriminate between the two.

Re-d. Q. 84. To make the matter clearer, tell me how this operation of removing the wax to form the record differed from the well known graphophone method of recording, except, of course, with regard to the difference between vertical undulations and lateral undulations ? 244

A. There was practically no difference, except in the mounting of the stylus, and in this case a spring being used, which as I knew of the graphophone was not so. I had heard of it and seen it, and these springs were iridium tipped, while the stylus of the graphophone company were using stone, and of course a different shaped groove. This was a comparatively pointed stylus, that is, V-shaped, while the graphophone company were using a more circular. The stylus did not have as vertical a position, that is, had a tracing angle, but the wax, of course, was removed just the same.

245 Re-d. Q. 85. Please make it clear whether or not the record groove extended all the way through the wax coating to the brass plate beneath, or whether it extended only a part of the way through the wax coating?

A. The record groove was about the same depth as we were using in the etched record, while the wax was of considerable thickness, therefore it only extended a very small part into the wax coating.

Re-d. Q. 86. Do you know if Mr. Wilson is now alive?

246 A. I could not say positively, though I am quite sure he died several years ago. He was in an insane asylum, the last positive facts I heard of him, and I understood later he died there.

Re-d. Q. 87. Please make it clear to just what extent the laboratory in which Mr. Wilson did this work was equipped with the necessary apparatus therefor?

A. As I said before, we were using the apparatus regularly in the work, that is, we were coating these brass plates with the wax, shaving them with a shaving machine, coating 247 them with graphite and pressing matrices of hard rubber into them and making a copper shell from these. We were well equipped for doing this work, and had the necessary appliances, such as heating arrangements, tables for coating these plates, and shaving machines, several styles of presses, and the usual equipment of such a laboratory, such as tools and lathes. This was in the lower flat, while the second story was used for recording exclusively, and here we had the usual appliances such as recording machines, piano, reproducing machines and small tools necessary for this work. Also a 248 complete room fitted up for etching.

Re-d. Q. 88. Do you recall whether the matrix made by Mr. Wilson was pressed into hard rubber to form the duplicate record?

A. It was either hard rubber or celluloid; very likely hard rubber.

Re-d. Q. 89. Was this hard rubber duplicate tested on a reproducing gramophone?

A. Yes, it was tested to find out what the results were, as one or two of the first ones were reproduced directly from the wax, which is found to be not nearly so satisfactory.

249

Re-d. Q. 90. What were the results from the rubber duplicates?

A. They were very good in some respects, and lacking in others. Mr. Wilson intended going further into this matter, but Mr. Berliner said it was wasting time, as the Bell and Tainter patents covered this point, and they had many years to run yet.

RE-CROSS-EXAMINATION BY MR. MAURO:

250

Re-x-Q. 91. In making the wax record referred to in your re-direct examination, did Mr. Wilson use the same stylus that was used in making the original of the etched record?

A. No, the stylus of the etched record was a much weaker spring, and was not sufficient to go deep enough into this wax, though the general construction of the sound box was the same.

Re-x-Q. 92. I meant to ask you particularly about the stylus point.

A. The stylus point was, as far as I can remember, entirely similar, that is, I do not recall it having been changed. If they did change it I did not know of it, as it looked alike. 251

Re-x-Q. 93. Did you hear Mr. Berliner remark to Mr. Wilson, in 1893, that this line of experiment was a waste of time, because the Bell and Tainter patents covered that mode of procedure, or words to that effect?

A. I do not recall Mr. Berliner's words in the matter, or hearing him say it, but talking it over with Mr. Wilson he told me about it, and he thought it should be followed up because there were good possibilities there. 252

Re-x-Q. 94. And all this occurred at a time you were attending school, and dropping into the laboratory after school, is that the case?

A. Not dropping in, because I was employed there. I went there in the morning before going to school, and in the afternoon after returning from school, which was from three to five-thirty or six o'clock.

Re-x-Q. 95. And at this time the Graphophone Company were using a curved edge jewel point stylus, were they?

A. So I understand. I was never in the Graphophone

253 Company laboratory. Only from the talk around the laboratory in our place. I, at that time, did not study the patents, and it was only my impression of it.

Re-x-Q. 96. Did you know the graphophone as it was on the market at that time?

A. I suppose so. Could not place it just now. I knew of it, and knew the process generally.

Re-x-Q. 97. At all events you knew either by having seen it, or as a matter of general information, that the recording 254 stylus of the graphophone was a curved edge jewel, or, as you call it, stone?

A. I understood so.

Re-x-Q. 98. Up to what time was Mr. Wilson employed by Mr. Berliner?

A. I believe he was there when I left. I refer now to 1893.

Re-x-Q. 99. Who was assisting Mr. Berliner in making records in 1898, when you say this same general operation was repeated?

255 A. This was not done in Mr. Berliner's laboratory except by myself, though once or twice Mr. Berliner also did some work in it.

Re-x-Q. 100. That is, after 1893 the operation of making an original record in wax was not performed in the Berliner laboratory, except by yourself and Mr. Berliner. Is that right?

A. I think Mr. Berliner's son did some work in this; and as I mentioned, I believe, in my earlier testimony, the laboratory was removed from Washington, and was then under the 256 Berliner Gramophone Company in Philadelphia.

Re-x-Q. 101. I want to know your own personal knowledge of who, besides yourself, if any one, connected with Mr. Berliner's laboratory, made an original sound record by operating directly upon a tablet of wax, as you have described?

WITNESS asks: At what date?
BY MR. MAURO: Subsequent to 1893.

A. I do not know, as I left in 1893, and did not return until 1896. At this time I do not recall any experiments or

257 work in this direction, except in metal, and these were made some later by myself, and those in the laboratory shortly before my return. At that time Mr. Fred Geisburg, Mr. W. Suess, Mr. Sinkler Darbey, Mr. Springer, and Mr. Joseph Jones were working in the laboratory, and of course, Mr. Berliner also. These are all I can remember now.

Re-x-Q. 102. Did Mr. Berliner remark in 1898, or about that time, that it was a waste of time to pursue such experiments on account of the Bell and Tainter patents?

A. In 1898 he did not remark that way, as he thought that some day that process would come in use, that is, when the graphophone patents should have expired, though he was not in favor of doing much work in this, and it was mostly done by others. 258

Re-x-Q. 103. How do you know he thought that?

A. Because he said so. In fact, when he saw some records which were supposed to have been made that way, he said that appeared to infringe the graphophone patents.

Re-x-Q. 104. And that was in 1898, was it?

A. It was. I would not say positively that date. It may have been before or after. 259

Re-x-Q. 105. Who was making the records which Mr. Berliner pronounced an infringement of the graphophone patents?

A. He did not pronounce them as such. He said he thought they were such. They were different from our records, and the first ones were made, I understand, by Mr. Eldridge R. Johnson, of Camden. We did not know how they were made, as the process was kept secret.

Re-x-Q. 106. Under what commercial name were they put out? 260

A. They were not put out commercially at that time, that I know of. We only saw the samples when this discussion was carried on. The first of these I saw in London on my returning to the United States. The Company at that time asked me if I knew how they were made, and after a close study I told them that I did not, but probably cut in the metal or wax a similar way, as the surface was not as bright as the records we were making. I said they were probably cut directly into some soft material.

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RE-DIRECT EXAMINATION BY MR. EDMONDS :

Re-d. Q. 107. At the time (1898) when you produced duplicate records by first cutting a lateral groove in wax, then black-leading the surface of the original record, forming a matrix thereon by electrolysis, and pressing such matrix into a suitable material, did you know, or had you any reason to believe that this, or substantially this, process was claimed to be the invention of Joseph W. Jones, or did you have knowl- 262 edge that he had applied for a patent covering it ?

Objected to as immaterial.

A. No, I did not know of any application of Mr. Jones, nor did I know of his claiming this invention, as I never thought it possible to apply for a patent, the process being generally known among us.

Signature and Certificate waived.

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NEW YORK, July 19th, 1905.

Met pursuant to agreement.

Present—Counsel as before.

GEORGE A. MANWARING, being duly sworn in answer to interrogatories propounded to him by Mr. Edmonds, deposes and says as follows :

264 Q. 1. What is your name, age, residence and occupation ?

A. George A. Manwaring; age, thirty-six; residence, Bayonne, N. J.; occupation, Consulting Mechanical Engineer.

Q. 2. In the employ of what concern are you, and for how long have you been in that employ ?

A. Columbia Phonograph Company; about one year and a half.

Q. 3. Is it a fact that the Columbia Phonograph Company is and has been for some years past the manufacturer of the original records handled by the American Graphophone Company, whether cylindrical or flat ?

265 A. To the best of my knowledge and belief; yes.

Q. 4. Is it also true that down to April, 1902, the only commercial records made or sold by either the Columbia Company or the American Graphophone Company were of the cylindrical type?

A. Upon information and belief that is true except to this extent, that prior to that date the Columbia Company had sold zig-zag disc records supplied to it by the Universal Talking Machine Company. Under an arrangement which began about the first of April, 1900, and sometime in the fall 266 of the year 1901, the Columbia Company began to use zig-zag disc records furnished it by the complainant herein.

Q. 5. Since the manufacture and sale of the zig-zag disc records was commenced by or through the American Graphophone Company, the preliminary work of making the original record has been done by the Columbia Phonograph Company in New York, and the commercial records, sold for use on talking machines, have been made from such originals at the factory of the American Graphophone Company at Bridgeport. Is this correct? 267

A. Yes, that is correct, since my connection with the Company.

Q. 6. And you are familiar with the process followed in the manufacture of the commercial sound records in question?

A. I am.

Q. 7. Will you please state that process, beginning with the first step of forming a zig-zag record in a disc of wax-like material?

A. A suitable disc of wax-like material is placed on the turn-table of what is known as a recording machine, a zig-zag 268 record made thereon by well known means, after which said disc is removed, made electro-conductive by brushing on its surface some plumbago or finely divided graphite, after which it is immersed in a copper plating bath where it is allowed to remain until a copper shell of suitable thickness is formed on the wax disc. After the shell has formed it is stripped from the wax disc, trimmed and backed with a thicker piece of metal, and the copper is then nickel plated, thus completing what is known as the "master matrix." A wax mold is made from this master matrix by flowing over said matrix molten

269 wax or wax-like material, which is allowed to cool and set, after which it is lifted off the matrix. Said mould is then made electro-conductive as hereinbefore stated, electro-plated with copper, said copper is removed, backed with a thicker metal and the copper face nickel-plated, thus completing the "stamping matrix." This stamping matrix is then used to impress zig-zag lines representing sound vibrations into a material which becomes plastic under heat, and said material being allowed to come in contact with the stamping matrix after 270 which it is removed therefrom, the edges trimmed and polished, resulting in the disc record of trade. These disc records of trade are sold by the American Graphophone Company through its selling agent, the Columbia Phonograph Company.

Q. 8. Is the process which you have described the only process used by either the American Graphophone Company or the Columbia Phonograph Company in the preparation or manufacture of the disc sound records of trade, since you became connected with the Columbia Company?

271 A. Yes.

(Certificate and signature of witness waived.)

NEW YORK, July 24, 1905.

Met pursuant to adjournment.

Present: Counsel as before.

272 JOHN O. PRESCOTT, a witness called on behalf of the defendant, having been duly sworn, in answer to interrogatories propounded by Mr. Edmonds, deposes and say as follows:

Q. 1. What is your name, age, residence and occupation?

A. John O. Prescott; 34; Montclair, N. J.; Superintendent of Recording, American Record Company.

Q. 2. At what place operated by the American Record Company are you engaged? A. In the laboratory at 241 West 23rd Street, this city.

Q. 3. What other place is operated by the American Record Company? A. The pressing plant in Springfield, Mass.

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Q. 4. What part of the American Record Company's work is done in each of these two places? A. In the laboratory in New York the recording of the records and the making of the matrices; in Springfield, the pressing of the records from the matrices.

Q. 5. And is the work done at the laboratory here in New York City under your supervision? A. It is.

Q. 6. And how long has that been the case? A. Since the beginning of the Company, in the spring of 1904.

Q. 7. Am I correct in assuming that all of the preparatory 274 work on the American Record Company's sound records is done in the New York laboratory, and that the matrices produced there are then forwarded to the pressing plant at Springfield, where the final step of the process, *i. e.*, pressing the ultimate sound record in a suitable material is performed?

A. You are.

Q. 8. Please now state in detail the American Record Company's process of making the commercial sound records of trade, commencing with the first step of recording a musical 275 or other selection in a suitable tablet?

A. We prepare a tablet or flat disc of waxlike material, which is placed on a suitable turntable, and a zigzag sound record is made by well known means. This sound record is then prepared in such a manner as to make the surface electro-conductive by treating it with plumbago or graphite, and when so treated it is placed in a bath of copper sulphide; an electrotype or shell, which we call the original shell, is formed on the surface. This original shell is then separated from the wax tablet and the surface treated in such a manner that another 276 deposit of copper can be made on the surface, and the two separated after the deposit has attained a sufficient thickness. This second shell we call the "mother," and it is a copy in copper of the wax record. We then treat this "mother" in the same manner as we treat the original copper shell and make a deposit on the surface of this "mother," and when separated from the "mother," it is a copy of the original copper shell. This second copper shell is then backed up by a copper disc of suitable thickness, and the surface nickeled and

277 sent to our factory at Springfield, where it is used for pressing the commercial records in plastic material.

Q. 9. It has been asserted in this record that the process of the American Record Company involves the cutting of a sound record in a waxlike material, making the surface of this material electrically conductive, and depositing the electro plate thereon, then removing this electro plate and pressing the same into a suitable material to form the commercial sound record. Are you sufficiently familiar with the subject 278 under discussion to say whether or not this is a practical and commercial process for obtaining the commercial sound records of trade?

A. I do not consider that process complete, in that it omits a step which we have found to be essential to making a commercial success of this kind of record. We have found that the matrices in use in the pressing plant are liable to damage, so that the number of pressings which we can obtain from a matrix varies from ten to five hundred, depending on the usage which it receives at the hands of the workmen. If the matrix 279 is damaged after comparatively few pressings have been obtained, say ten, it is necessary to re-cut or re-engrave that record, employing the services of the artist again before any more records of that particular title can be obtained. This is not only expensive, as it involves the cost of the talent, but many times is impossible, if the artist is not in the neighborhood, or his services cannot be readily obtained. It is embarrassing if this damage happens to a matrix for which there is a large demand for the records, as the manufacturer is not able to fill the demand oftentimes, owing to the impossibility 280 of getting the services of the artist. He may be away traveling with a theatrical company, as is often the case. We have found that the original cutting usually serves for only one original copper shell, and it is not available for use in making subsequent copper shells.

Q. 10. State why.

A. On account of the damage sustained to the surface of the wax in removing the copper shell therefrom, as the wax has a tendency to adhere to the copper.

Q. 11. Please state briefly just why these objections to the

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process last mentioned are not inherent in the American Record Company's process which you have detailed?

A. Our process involves the making of what we call "mothers," and from these we make the copper shells which are used from matrices. These "mothers," as well as the original shells, are kept for purposes of making duplicate matrices.

Q. 12. How much of a matter is it to prepare these duplicate matrices,—a matter of any considerable expense or inconvenience? 282

A. It involves little expense or inconvenience, the process being very simple.

Q. 13. That is to say, the process you have previously described in connection with the process used by the defendant company?

A. Yes.

Q. 14. Take the two processes of duplication mentioned in this deposition, and tell me which of these, in your opinion, is best calculated to conduce to the commercial success of the talking machine art, so far as it concerns the production of 283 commercial sound records?

> Objected to as incompetent, and the form of the question as not warranted in assuming that the two things are different processes.

A. I believe the process which involves the making and preserving of a copper "mother" in the process described above, is the better adapted for the manufacture of commercial sound records, with the conditions prevailing in the market today. 284

CROSS-EXAMINATION:

x-Q. 15. Will you please state briefly how the first electroplated shell is treated, so as to enable it to receive the second deposit that you have termed the "mother"?

A. I consider that one of our trade secrets, one which involved some expense, and I prefer not to answer the question.

x-Q. 16. Have you ever proceeded by taking the first electroplated shell, and obtaining therefrom a wax impression or

285 counterpart, and then treating that wax counterpart in the same manner as you have treated the original record, to obtain therefrom stamping matrices?

A. Only experimentally.

x-Q. 17. Am I correct in understanding that in carrying out defendant's process, you employed three different electro plates, viz., the shell obtained from the original wax tablet, second, the "mother" obtained therefrom, and third, the stamping matrix obtained from the "mother"?

286 A. Yes.

x-Q. 18. Can the first named electro plate be employed for stamping commercial sound records in plastic material?

A. Yes, when properly backed up.

Signature and certificate waived.

New York, August 9, 1905.

Met pursuant to agreement.

287 Present, counsel as before.

Arthur P. Greeley, a witness called on behalf of defendant, having been duly sworn, in answer to interrogatories propounded to him by Mr. Edmonds, deposes and says as follows:—

1 Q. What is your name, age, residence and occupation?

A. Arthur P. Greeley; 42 years of age; resident of Washington, D. C.; am a solicitor of patents and mechanical expert.

288 2 Q. You may state what experience you have had in the consideration of Letters Patent and mechanical structures generally, and in particular what you have had to do with the art of talking-machines and supplies therefor and processes used in connection therewith.

A. I was for about sixteen years connected with the United States Patent Office, being appointed a fourth assistant examiner in 1884 and serving as an assistant examiner in the several grades of fourth assistant, third assistant, second assistant and first assistant examiner until 1891, when I was appointed a principal examiner. I served as principal

469 same is marked " Defendant's Exhibit Jones Patent No. 763,564 ".

Defendant's counsel also offers in evidence copies of the following Letters Patent of Great Britain :—

Patent No. 1644 of 1878, and the same is marked " Defendant's Exhibit Edison British Patent No. 1644 ".

Patent No. 15,232 of 1887, and the same is marked " Defendant's Exhibit Berliner British Patent No. 15,232 ".

470 Patent No. 16,342 of 1887, and the same is marked " Defendant's Exhibit Anders British Patent No. 16,342 ".

Patent No. 12,593 of 1888, and the same is marked " Defendant's Exhibit Gouraud British Patent No. 12,593 ".

Patent No. 1058 of 1889, and the same is marked " Defendant's Exhibit Adams-Randall British Patent No. 1058 ".

Patent No. 15,206 of 1891, and the same is marked

471 " Defendant's Exhibit Gouraud British Patent No. 15,206 ".

Patent No. 1478 of 1894, and the same is marked " Defendant's Exhibit Young British Patent No. 1478 ".

It is hereby stipulated and agreed that " Defendant's Exhibit Berliner Franklin Institute Lecture " was published by the Franklin Institute at Philadelphia, Pa., in December, 1895, and formal proof on this point is hereby waived.

Defendant's counsel offers in evidence copy of patent No. 548,623, granted October 29, 1895, and the same is marked "Defendant's" ~~Complainant's~~ Exhibit Berliner Patent No. 548,623 ".

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itiff, having been duly sworn, in answer to interrogatories propounded to him by Mr. Edmonds, deposes and says as follows :

Q. 1. What is your name, residence and occupation ?

A. My name is Louis Edward Levy ; my office is 1221 Spring Garden Street, Philadelphia ; my profession is that of photo-chemist.

Q. 2. Please state what your experience has been in the practice of your profession and what, if any, familiarity you have had with the art of electrotyping. You may also state in

473 this answer what, if any, experience you have had with respect to the talking machine art and processes used in connection therewith.

A. My experience in the technology of electrotyping dates back to 1873 practically; and theoretically, before that. In that year I developed a process of photo-electrotypic reproduction, the patent for which was applied for in 1874 and was issued on January 26, 1875, under the name of the Levy-type. This was a process of photographic reproduction dependent upon the original being reproduced through electrotype. I 474 developed that business and established a considerable plant for its exploitation. I worked it until 1878, after which I had my electrotyping done by other electrotypers, obtaining my photo-engravings by stereotypy. Subsequent to that, I had constant occasion for accurate reproductions, or accurate duplicates, of photo-engraved plates, and was constantly called upon to do what I could to raise the quality of the work produced. In the electrotype plant where my work is done, in 1881, I began the work of reproducing half-tone engravings by photography, and the necessity of a 475 very high degree of exactitude in the electrotype duplicates of these half-tone engravings concentrated my attention still further upon the problem of increasing the quality of the electrotypes. I heve been actively connected with the Franklin Institute, of Philadelphia, for many years, and, from 1886 on, was consulting member of the Committee on Sciences and the Arts in the specialty—in the line, rather—of graphic technology. Since 1896 I have been a member of the Committee of Sciences and the Arts; was Chairman in 1901; and have been Chairman of numerous sub-committees, having charge of 476 investigations in this field.

Q. 3. That is graphic technology?

A. Graphic technology generally. For some years past, I have been a lecturer. I lectured at the Franklin Institute on the subject af the technographic arts. I might state, in this connection, that I was consulted in various capacities in connection with the subject of electrotyping, by Mr. Emil Berliner, of Washington, from 1886 on—or 1887 (I cannot certainly recollect); from that time on. In 1899, as Chairman of the Sub-Committee of the Franklin Institute,

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I had charge of the investigation into the technology
of the graphophone Grand, as invented by Mr. Macdonald, and
had occasion thus to make a very searching investigation of
the whole subject.

Q. 4. Will you kindly give, out of your experience and ob-
servation in the electrotyping art, a brief resume of the prac-
tice and processes common in that art down to, say, 1896?

A. The technology of the art of electrotyping has been well
known and very thoroughly published since about the early
478 '40's. There are two works on the subject which remain to
this day as basic guides to the general technology, one by
Smee and one by Rosseleur. In 1873, when my practical con-
nection with the art commenced, the methods employed were
those clearly outlined in those works. There was then in use
as the bedding into which the objects to be reproduced were
moulded a mixture of bees wax with various additions, such
as stearine, paraffine, whiting, graphite and other substances,
the moulding material being prepared by each electrotyper
after the modifications determined by his own experience and
479 practice. Each of these modifications had certain advantages
and certain disadvantages, but they served the general pur-
pose of the time, which was, in the main, the duplication of
wood engravings. With the development of the photo-engrav-
ing arts, which began at about that time, the demand for in-
creased facility of production and, at the same time, of
a higher quality of results steadily increased, and, by
the middle of the '80's, considerable advance had
been effected in both directions. At that period the
invention of the photo-engraved half-tone plate still further
480 widened the demand for electrotype duplicates, and, at the
same time, gave increased emphasis to the existing demand
for higher quality. The latter demand was gradually met by
various operators, each more or less upon lines of his own
devising, so that, by the time another decade had passed,
around the middle '90's, it was possible to reproduce these
extremely fine and exact engravings with a high degree of prac-
tical quality. Since then the art has been still further refined
through the greater accuracy in the mechanical appliances for
the production of the moulds, greater care in the preparation
of the material for the moulds and through higher technical

481 proficiency generally. The essential change that came about in the early '90's in the production of moulds for electrotyping was the admixture of ozokerite, or mineral wax, into the material for the mould, and, in many cases, the entire replacement of bees' wax by this other material. Another important development at this stage, primarily owing to the demands for exact reproduction of half-tones, was the careful purification of the wax from all gritty substances, and the obtainment of a very even surface upon which to make the impression. Still another modification at this stage was the refinement of the 482 moulding material by determining with exactitude the quantity of graphite or other amorphous material in addition to the wax, to produce such compound as was most thoroughly adapted for the purpose.

Q. 5. Now please state as briefly as possible the several stages in the process of electrotyping as practiced in and prior to the year 1896.

A. The moulding material commonly consisted of wax—bees' wax—and graphite. This was flowed into a pan in its melted state, the pan being leveled and the wax compound allowed to 483 cool. Upon this the engraving or other object to be reproduced was laid face down, and then subjected to pressure under a toggle press, if the form was not very large, or under a hydraulic press, if the form was large. After being thus impressed, the pan with the form impressed upon it was withdrawn from the press and the form withdrawn by being vertically lifted from it. This wax was then covered with a quantity of powdered graphite, just thrown over it by hand in some cases, and in some cases applied in a so called blackleading machine, the effect in either case being to brush the plumbago 484 from the surface and to bring that which adhered to the surface into a polished condition. The purpose of this blackleading was to make the mould electrically conductive. In this condition the mould was hung in a bath of copper sulphate solution, placing in front of it a plate of copper connecting the copper with the positive pole of a galvanic battery and connecting the mould with the negative pole of a galvanic battery. Under the influence of the electric current, a deposit of copper was made upon the surface of the mould, and when this deposit had attained a sufficient

485 thickness, the mould was taken from the bath, the electro-deposited shell was lifted from the mould and then strengthened by adding a thickness of lead or stereotype metal upon the back, the lead being flowed on in a melted condition. The stiffened electrotype shell was then shaved on the back to a proper thickness and any inequalities of level which had come about by reason of melted metal on the back were hammered out from behind. After this hammering and leveling process, the plate was again shaved to the thickness finally required 486 for being mounted upon a base for ultimate use in the press.

Q. 6. Are you familiar with the process used in and prior to 1896 in the Hydrographic and Geological Survey offices at Washington in the duplication of maps, and, if so, please state that briefly?

A. I have some knowledge of the work done there and am aware of the fact that the maps engraved by hand upon copper plates were then and for some time previously duplicated by electrotypes made directly from the surface of the engraved copper plates and reduplicated from these matrices by a like 487 method of direct electrotypic reproduction.

Q. 7. Were you familiar with the development of the gramophone by Mr. Berliner?

A. Yes; I was fairly cognizant of the work as it went along.

Q. 8 Were you in close touch during that time with Mr. Berliner himself?

A. Yes.

Q. 9. Did it ever come to your attention that, in addition to the process of chemically etching a zigzag record groove in 488 a zinc plate, Mr. Berliner also demonstrated the feasibility of cutting or engraving such a record groove in a resisting material?

A. Yes. I was aware as far back as 1886 or '7 that Mr. Berliner had produced records in a flat plate of lead. My knowledge of the matter was derived from discussions of the subject with him, and in the course of his consultations with me as to the best methods of producing the depressions chemically.

Answer objected to as hearsay.

Q. 10. What was the form of the record cut or engraved in the material as referred to by Mr. Berliner—that is to say, was it vertically undulating or laterally undulating, and, therefore, of the character known as zigzag ? 489

A. It was laterally undulating on a flat round disk.

Same objection.

Q. 11. Are you able to say to what extent prior to, say 1896, it was understood and appreciated either by you or by 490 others with whom you came in contact that a sound record groove of the zigzag or laterally undulating type and of uniform depth could be cut or engraved direct in a resisting material rather than first traced upon a metal plate and then etched ?

A. The idea of cutting a zigzag groove of uniform depth in a resistant material was a familiar one to all those who were technically conversant with the subject. It appeared preferable to avoid a resistant material of any kind because any material that 491 offered resistance would inevitably affect the amplitude of the vibration, reducing it in a degree that increased with the magnitude of the vibration by reason of the fact that the stylus, in moving sideways, would be deflected by the spiral movements of the disc and so fail to record the full amplitude. In the case of the vertical movement the resistance is one of quantity to begin with, which is as the square of the depth, and is also further increased by the compression of the material to greater density. In the case of the lateral movement the stylus, when in the position normal to the line of the spiral, has to over- 492 come a given resistance. As it is deflected to the right or left from that normal position, the resistance of the material increases with the amplitude, through both elements which apply in the case of the vertical indentation, namely, the lessened course of the stylus as it moves sideways and the tendency to pack or condense the material as it presses it sideways, the result being that a maximum amplitude cut in a resisting material is appreciably less than the same amplitude cut in a nonresisting material.

Q. 12. I call your attention to defendant's exhibit Berliner

493 Franklin Institute lecture, December, 1895, and, in particular, to a process of direct duplication of gramophone records, as stated on page 15 (handing pamphlet to witness). Will you please state what, if anything, you know concerning the use of that process of duplicating gramophone records?

A. (After reading pamphlet) There are various ways that have been well known prior to 1896 of preparing a zinc plate for direct electrolytic reproduction. This method of depositing brass is one which I consider, from my
494 experience, to be less adapted for daily practical work than others which were then known. The zinc plate could be covered with copper by a process well known, namely, the copper-cyanide process, and the reproduction then proceeded with. I am not aware that the covering with brass offers any advantages but am aware that that and other methods have long been in vogue.

Q. 13. It appears in this record that in the Berliner laboratory or factory at Washington this process, as stated in the article before you and involving the deposition of electrolytic
495 brass, was used and that this process was followed by what Mr. Berliner termed "a simple method which consisted in covering the zinc record with a very delicate layer of electrolytic copper" upon which the copper shell, subsequently used for pressing, was electro-deposited. Have you any knowledge of the practice of this process by Mr. Berliner at his Washington laboratory prior to 1896?

A. I saw it in process.

Q. 14. And are you familiar with the gramophone records, such as the exhibits, Berliner records Nos. 2 and 3, which I
496 now show you?

A. Yes; I remember them very well.

Q. 15. It has been testified in this case that the etching process of forming the original record and production of copies thereof by electrolysis was defective for the reason, among other things, that the etching action of the acid left the surface of the groove in a roughly pebbled condition, and that because of this a blunt smoothing point or style had to be run through the groove. Have you any knowledge bearing upon the process used by Mr. Berliner and the com-

497 mercial results of that process leading you to disagree with this finding ?

A. My knowledge of the process of etching in zinc convinces me that there is essentially no need whatever for any polishing of the etched surface. Where a surface etched by the acid is at all lacking in a mirrorlike smoothness, it is due to impurities of the zinc used for etching. Where the zinc contains, as it is apt to contain, a percentage of lead or carbon, a certain microscopic roughness of surface results from the etching, but where the zinc is chemically pure a perfectly 498 smooth surface is obtained in the etching process.

Q. 16. Have you made any examination of one of the exhibit Berliner records before you, with a view to determining whether the record grooves of those records are or are not perfectly smooth ? If so, just what have you done ?

A. I have examined the record which I have here, exhibit Berliner Record No. 2, microscopically, and I found that the surface of the depression is smooth. I have taken pains to make a record of my observation in the form of microscopic photographs. I cut the record from behind almost 499 through and then broke the disk in two, so as to obtain the edge of the line in an absolutely nascent condition, that is to say, free from the effects of any tooling to smooth it. This edge or section I examined under the microscope, and made a record of the examination by photographing the image as magnified to 60 diameters. I here produce the negatives and the prints, one of them, which I mark No. 1, is produced by letting the light fall slightly from the left in order to show the lefthand side of the depression as free as possible from the effect of diffraction, which is inevi- 500 table in the passage of light across a sharp edge. The other photograph, which I mark No. 2, has been lighted in such a way that the rays of light do not fall upon the edge of the section, and is, therefore, dark at its contour and clear of all diffraction. The magnified image of the cross section proves that the depressions are perfectly smooth.

Defendant's counsel offers in evidence the negatives produced by the witness and same are marked Defend-

501 ant's Exhibit, Levy Negative No. 1, and Defendant's Exhibit, Levy Negative No. 2.

Defendant's counsel also offers in evidence the photographic prints produced by the witness, and these are marked Defendant's Exhibit Levy Print No. 1 and Defendant's Exhibit Levy Print No. 2, respectively.

Q. 17. Are you familiar in a general way with Jones Patent No. 688,739 here in suit?

502 A. Yes, I am familiar with it.

Q. 18. In the specification of this patent a comparison is drawn between the vertical cutting method and the laterally cutting method, with respect to the resistance offered to the style, such resistance, it is said, being greater in the vertically cutting method than in the laterally cutting method. The patentee then continues "On account of this difference in principle I am enabled to obtain more accurate and, therefore, better, records of the original sounds." Please say whether or not the discovery of this so-called "difference in 503 principle" was new with Jones in 1896 or whether it was known and appreciated prior to that time.

A. It was not new to any of those who were conversant with the art; that is, not new to those who were conversant with the technology of this art; it was then well known.

Q. 19. Do you include yourself among those who were conversant with the technology of the art prior to 1896?

A. I do.

Q. 20. And Mr. Berliner?

A. I should naturally include him.

504 Q. 21. I call your attention to the Jones specification and particularly to the portion between lines 77 and 100 of page 1, and ask you to state if anything is set forth at that point of the specification which involved any departure from well known practice and procedure in the art of electrotyping?

A. (After reading specification) I would state that the ordinary process of covering with an electric-conducting metal is indicated here as commonly employed. The substitute method referred to, of nitrate of silver, is inapplicable and impracticable in this case. There is nothing new here set

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forth, all these procedures having been in '96 and for a long time previously well known in the art.

Q. 22. I next call your attention to that portion of the specification commencing at line 36 of page 2, and ask you to state, from your knowledge of the art, whether you agree or disagree with what is there set forth?

A. The statement that this process is impracticable and unsuccessful has no foundation. The reasons given, namely, "when the conducting material (as plumbago) is deposited upon the vertical irregularities that are the very 506 essence of this kind of record, it forms a covering that resembles on a minute scale a light fall of snow over a landscape"—that is true; but this covering is brushed off in the same way as it is brushed off in all the practice of electrotyping, only an extremely thin film of the material remaining on the surface of the wax. This brushing of the plumbago from the surface of the wax after it has been applied thereon is an inevitable procedure in the preparation of the mould and does not leave anything more than the extremely tenuous film above referred to. If anything more than such 507 film is left on the plate—on the mould—it is only through the plumbago or the mould surface being moist, and is a procedure which no skilled workman would be guilty of. The statement that "the sharp contours of the vertical irregularities are rounded (the more delicate and minute irregularities being filled in and completely obliterated) with a resultant mutilation of the record" appears to me very far fetched. In the first place, in any proper sense of the word "sharp", there are no sharp contours of the vertical irregularities. The irregularities are all rounded more 508 or less. In the second place, the idea of the more delicate and minute irregularities being filled in and completely obliterated is conceivable only on the assumption that the work has been botched. A skilled hand would leave the most minute irregularities unaffected. The further statement to the effect that "when the electro-plate die is pressed into the surface to be stamped any inequality in the material being stamped would cause unequal impressions to be made, some deeper than others, which is fatal to the accuracy of a record, whose very existence lies in the comparative depths and heights (vertical) of its

509 irregularities" assumes a condition of the surface to be
stamped which, in any reasonably skilled practice, is always
avoided, and which, in the practice of every first-class electrotype
establishment is always avoided. The further statement
regarding "the presence (between the die and the material
being stamped) of minute particles of dust or other foreign
matter or even of particles of air (air bubbles) would to that
extent still further distort and disfigure the impressions
stamped by an already inaccurate die" also assumes condi-
510 tions that have long ago been avoided, and which have not
come up in practice within twenty years. The further statement
that "whereas in the laterally undulated records any vertical
deformation (whether due to the causes just pointed out or to
any other cause) does not in the slightest degree affect
the accuracy of the record" is inaccurate in the sense that the
surface to be stamped, if it contains the inequality of material,
the particles of dust, or other foreign matter, &c., alluded to
in the specifications, would be at least as obstructive to a
good result in the case of laterally undulating records as in
511 the case of those above referred to. The statement that "the
deposit of a film of conducting material does not modify the
lateral outline but only the vertical irregularities" is dis-
tinctly inaccurate. In point of fact such film of conducting
material is too minute and tenuous to modify the resistance
offered laterally or vertically and in this respect is wholly im-
material. The further statement that the deformations caused
by the presence of foreign particles in the stamping or press-
ing process are vertical and consequently do not affect a record
that depends upon its lateral and not its vertical outline is
512 untrue, inasmuch as any deformation or foreign particles en-
countered in the stamping process would be overcome with
equal facility by the object that was to be impressed, whether
its features—in this case, the record—had a lateral or vertical
outline. In point of fact, in practice long antecedent to 1896
the material to be impressed was carefully cleared of all for-
eign particles and the surface upon which the impression was
to be made was carefully flattened to a plane.

At this point recess was taken until 2 P. M.

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At 2 P. M., parties met pursuant to adjournment.

Q. 23. In a former question I asked you concerning the matter of resistance upon a vertically undulating style and that upon a laterally undulating style and the extent to which this was recognized and appreciated by men like Mr. Berliner and yourself prior to 1896. Will you please make it clear just to what extent this condition was appreciated and what, if any, bearing the matter had upon the adoption by Mr. Berliner of the etching method, if you know? 514

Objected to as incompetent.

A. Well, the difference of resistance to the stylus of the vertically cutting and the lateral cutting, I think I have indicated. At all events I tried to indicate that the vertical cutting has a given amount of resistance and the lateral cutting in wax a somewhat lesser resistance—a considerably lesser resistance—and that the lateral motion upon a plane through a practically non-resistant material has practically no resistance at all, and, as regards the recognition and appreciation of that fact, that was well appreciated from the beginning as far as I can remember. In the discussion with Mr. Berliner of the matter of his cutting in lead on which he was working for awhile, the idea of cutting through wax laterally was discussed and I understood at the time that that was already known or, at least, that some patent or other, had already been taken for it—that Bell's work had covered it. I think I adverted to that very thing in my report of 1899, where I looked into Bell's work on the subject. At any rate it was known to us at the time that the idea of cutting in wax had already been considered. 515 516

Q. 24. Cutting in wax how?

A. Laterally. The thing to do, as it appeared from the beginning, was to find a material which had no resistance at all.

Q. 25. And was it regarded that this material had been found in the waxy resist which Mr. Berliner adopted to cover his zinc plate?

A. Yes.

517

CROSS-EXAMINATION BY MR. MASSIE:

x-Q. 26. You have spoken at Q. 3 of "half tones"; this refers to a kind of picture, does it not, and has no relation to sound records?

A. This has relation to engraved plates of extreme fineness.

x-Q. 27. Is any engraved plate of extreme fineness and is every such plate spoken of as a "half tone"?

A. Not every plate of extreme fineness is necessarily a half
518 tone, but every half tone is necessarily a plate of great fineness. A half tone plate is a photo-engraved reproduction of a subject, picture, design or whatever else it may be, produced by lines and stipples, the stipples being produced and lines engraved by etching into a plate.

x-Q. 28. Near the beginning of your answer to Q. 2, you spoke of changing the process which you yourself carried out to stereotype. Please state briefly what "stereotype" means?

A. Stereotyping is the reproduction of a relief engraving
519 or any other subject by means of making from it a mould and casting into that mould stereotype metal.

x-Q. 29. Why did you change your process from electrotype to stereotype?

A. Because I found it to be more expeditious.

x-Q. 30. Towards the close of the same answer you spoke of removing any inequalities of level by hammering out from behind. Do you refer to inequalities upon that surface of the shell which was adjacent to the wax mould?

A. Yes. The leveling up is requisite by reason of the
520 metal, which is in melted condition upon the back of the electrotype, cooling unevenly and thus causing slight variations in the plane of the surface of the shell.

x-Q. 31. Have you ever produced disc sound records to the extent, at least, of obtaining a matrix and preparing the same for impressing with suitable material, or have you ever observed such process?

A. Yes; I was going to say that I have done more or less of the process with my own hands and have been present at the complete operation over and over again.

521

x-Q. 32. In this process of making disc sound records, was any leveling up required or performed?

A. No.

x-Q. 33. In answer to Q. 10 (I think I have these numbers right) you spoke of persons technically conversant with the subject. What do you mean by the word "technically" in this connection?

A. Conversant with the subject either by close study of its details or by actual practice.

x-Q. 34. How else would any one be conversant with the subject—that is, not technically conversant? 522

A. One might be generally conversant with the subject without being technically conversant with it. It occurs to me that a more complete definition in answer to this question might be given by simply saying that one might have what is known as an academic knowledge of the matter.

x-Q. 35. You used the word "technically" in this definition as relating to a practical working knowledge as contradistinguished from knowledge obtained solely from literature; is that about correct? 523

A. Yes; as distinguished from knowledge obtained solely from literature.

x-Q. 36. What feature of novelty or advantage did your Committee observe in the Graphophone Grand referred to in your direct examination?

A. The greater length of line comprising any given amplitude.

x-Q 37. How is that an advantage? What is the object of producing the greater length of line, etc.?

A. We did not find any special advantage excepting that it enabled a slower rotation of the cylinder for a given rapidity of surface speed. 524

x-Q. 38. What is the advantage of having a slower rotation for a given surface speed?

A. We did not find any advantage particularly. The claim was, however, that there was an advantage in it and that the incision of the tool was made with less back backing—that the tool, in going around there, was less retarded or, at least, was less backed up—held back. That matter is all on the record.

x-Q. 39. Two or three answers back you spoke of ampli-

525 tude and, in your direct examination, you spoke of amplitude of vibration in connection with the resistance of material being cut. Do you use the word amplitude in the same sense in both connections?

A. Yes.

x-Q. 40. Does the amplitude of vibration have anything to do with the *length* of the record groove?

A. No. The amplitude is determined by the movement of the stylus and the length or the rapidity of the movement of 526 the disk, or the cylinder, on which the record is being made.

x-Q. 41. How did you find the contour of the Graphophone Grand record groove to compare with the contour of the sound records formerly known, that is, with respect to the slope, degree of curvature &c.?

A. What do you mean by curvature?

x-Q. 42. By degree of curvature I mean departure from the normal circular outline of the cylinder?

A. I found that a record of a given amplitude was extended over a longer line—over a longer space. A deviation—any 527 given deviation—was a little longer without being any wider.

x-Q. 43. The earlier record grooves had hills and valleys more abrupt and precipitous than those of the Graphophone Grand record?

A. The records that we had to compare with were lateral; they were not indentations.

x-Q. 44. That is, you compared the cylindrical Graphophone Grand records with disc records having lateral grooves?

A. No; we compared only two different sizes of cylindrical records at that time.

528 x-Q. 45. And the small-sized cylindrical records had lateral irregularities in the groove?

A. Yes.

x-Q. 46. While the Graphophone Grand record had vertical irregularities?

A. No, they had lateral too.

x-Q. 47. Are you entirely sure of that fact?

A. I think so; I cannot remember now distinctly; that is my impression of it.

x-Q. 48. How, if you know, were disc records made at the time of your investigations of the Graphophone Grand?

529

A. Disc records were made at that time in wax laterally and in zinc by engraving.

x-Q. 49. Who were, that is, what concerns, if you know, making disc records during the year 1899 in wax laterally; and who made disc records in zinc by engraving?

A. As far as I know, the zinc records were being made in Philadelphia by what I understood to be the Berliner Company; and wax records were being made, as I understood, by a concern in Camden.

x-Q. 50. Do you know the name of the concern in Camden that made wax records—that is, of course, I understand you to mean, laterally cut disc records? 530

A. I think it was then called the Victor Company, but I cannot be certain whether the name had been changed or not at that time; but I want to say that our attention was not given to any comparison in the disc record at that time, excepting in a scientific sense.

x-Q. 51. I was not inquiring especially as to the Franklin Institute Committee; I note you speak of "we" and "our"; but I was asking as to your own personal information. Did 531 you mean to say that the Berliner Company, if that was the name, was in 1899 making disc zigzag records by *engraving* in zinc?

A. That was my understanding and my impression.

x-Q. 52. How long, if you know, had that concern been making disc records by engraving in zinc?

A. The first engraved records in zinc that I can remember were about 1887.

x-Q. 53. How long had the Berliner Company, if you know, been making disc records by engraving in zinc? 532

A. From the time that they were established in Philadelphia, but when that was I cannot remember.

x-Q. 54. And how long, if you know, had that concern in Camden, supposed to be the Victor Company, been making zig-zag disc records by engraving in wax?

A. I do not know.

x-Q. 55. What is your authority for saying that concern in Philadelphia, in 1899 and earlier, had been making its records by engraving in wax—that is, how do you know this or what is your ground of opinion?

533 A. I saw some of the records that were produced there.

x-Q. 56. Please describe these records that you saw?

A. They were thin discs of zinc with the record produced in them by chemical erosion.

x-Q. 57. Is that concern, which you herein call the Berliner Company, or its successors, now making disc records by means of zinc plates having the sound record produced thereon by chemical erosion?

A. I do not know.

534 x-Q. 58. Is any person or concern, so far as you know, now making disc records by that means?

A. I do not know.

x-Q. 59. Do you know how disc records are made at the present time and within the past two or three years; if so, please state briefly the nature and extent of your knowledge?

A. I have no positive knowledge on the subject at this time.

x-Q. 60. What is the most recent date of which you have any knowledge on the subject?

535 A. The most recent date is when I visited the Berliner Institution in Philadelphia, when I had a personal knowledge of the subject by actual presence.

x-Q. 61. When was that?

A. I cannot remember definitely how long ago it was, but it was shortly before that establishment in Philadelphia was discontinued. I cannot remember just how long ago that was.

x-Q. 62. And at that time, disc records were made from zinc plates in which the sound record was produced by chemical erosion?

536 A. At that time they were so produced.

x-Q. 63. In one of your answers you say the resistance offered to the downward movement of the vertically cutting stylus varies with the square of the depth?

A. That is, about that, there being other factors.

x-Q. 64. Will you please explain how you arrive at this conclusion?

A. That was on the basis of the procedure that Edison employed originally for indenting the tinfoil.

x-Q. 65. Are the factors causing resistance in each case the

537 same; that is, will there be the same proportion of resistance to the depth of the traverse of the recorder in each case?

A. Each case means what?

x-Q. 66. Each case means, first, the indenting of the Edison tinfoil and, second, the action of the recorder upon a waxlike composition?

A. The resistance of a wax surface to indentation vertically is greater than its resistance to cutting laterally.

x-Q. 67. My question is this: Is the ratio of resistance offered by tinfoil to the downward movement of the Edison 538 indenting needle the same as the ratio of resistance of the waxlike composition to the downward movement of the cutting stylus now employed in this art?

A. It depends upon what was the backing of the tinfoil.

x-Q. 68. What was the backing of the tinfoil in Edison's work, referred to?

A. It was various; it was soft wax or it was a harder wax.

x-Q. 69. And in every case was the resistance offered to the Edison indenting needle practically as the square of the distance of the traverse of the needle? 539

A. It was somewhere between the square and the cube.

x-Q. 70. And you assume that the phenomena in cutting the wax record is so closely analogous to that with the Edison tinfoil that the resistance would likewise vary substantially as the square of the distance of the traverse of the cutter?

A. Well, if the conditions are the same, yes; that is, if it is a vertical indentation it would be about the same. Of course in the case of the Edison affair anything else than a vertical indentation is precluded.

x-Q. 71. You have spoken several times in your testimony 540 of "indenting." Do you understand that the action of the recording stylus, in making a record in waxlike composition is the same as the action of the Edison needle in making a record upon tinfoil?

A. It may be so and may not be so.

x-Q. 72. What authority have you for saying that, in producing the sound record in the waxlike composition, whether by a vertical or by a lateral movement, the material is *compressed?*

A. The authority of theoretical considerations.

541 x-Q. 73. Is that all?

A. That is practically all.

x-Q. 74. Referring to that portion of the specification of the Jones Patent in suit contained between lines 77 and 100 of page 1, and leaving out the reference to nitrate of silver, in your opinion, is this statement technically correct?

A. (After referring to specification) Technically this is all correct as far as it goes.

x-Q. 75. In answer to Q. 22, you say that strictly speaking 542 there are no "sharp contours." What is your authority for this statement?

A. Examinations under a magnifying glass.

x-Q. 76. Exactly what do you understand in this regard by the words "sharp contours"?

A. Well, a sharp contour is one which comes to an absolute edge—comes to a sharp edge.

x-Q. 77. Did you ever observe under a microscope any absolutely sharp edge?

A. Yes, sir, I have.

543 x-Q. 78. Please specify it?

A. Why, if you take the scales of the sugar balance, for instance, and magnify it, you find several sharp edges—absolutely sharp under the microscope—absolutely sharp as far as the human eye can perceive.

x-Q. 79. In criticising the second portion of the specifications cited in Q. 21, you say the supposed difficulties and objections there referred to had been removed many years before the date of the patent, &c. What material was the "form" pressed into which you there had in mind?

544 A. The various materials which had been in use, oh, as far back as I can remember.

x-Q. 80. You mean the various compounds containing beeswax or ozokerite or the like?

A. Yes.

x-Q. 81. Do you understand that the patent in suit in the sentence beginning line 55 of page 2 and also in line 63 of the same page refers to the use of such comparatively soft and waxlike materials?

A. I understand that it may refer to any one of the various substances used for obtaining moulds for electrotyping.

545
x-Q. 82. What material or materials does the patentee say
his electroplate matrix is pressed into?
A. The electrotype obtained from the wax record is stated
to be pressed or stamped into a disc or tablet of suitable
composition such as electrons or other fibrous material that
can be readily handled in a soft state and that will receive
truly and retain faithfully an accurate impression of the record
on the face of the die.
x-Q. 83. In what form, if you know, is this composition,
applied to the matrix? 546
A. This material is warmed and the matrix pressed into it.
x-Q. 84. Is this material, the moment before the matrix is
pressed into it, in the form of a flat disc with a perfectly
smooth surface adjacent to the matrix surface; or was it in
the form of a lump or mass of doughy substance, if you know?
A. When I saw them made they were in flat discs.
x-Q. 85. And that was about the year 1899 or earlier at the
place of the Berliner Company?
A. Yes.
x-Q. 86. Did the operator take pains, if you observed, to 547
make the surface of this flat disc perfectly smooth and true,
before the matrix was impressed into it?
A. It was flattened under a flat surface before it was put
in contact with the matrix.
x-Q. 87. You have spoken of electrotyping directly from
zinc plates, and then obtaining a second electrotype directly
from such first electrotype. What was the material of each of
these two electrotypes, and state briefly how the electrotypes
were made?
A. I have not personally made such electrotypes. I am 548
aware that such electrotypes have been and are being made.
I take it for granted that they are made either by one or the
other of several well known processes.
x-Q. 88. Please state, if you know, whether or not the
Berliner Company always and invariably removed all lead or
carbon from the zinc plates used by them?
A. As far as I know, they obtained their zinc plates in
the market. Some of them were found to contain impurities;
in other cases, they were to be practically pure.
x-Q. 89. Those zinc plates that were practically pure would

549 not, after etching, present the roughened surface in the record grooves ?

A. They would not.

x-Q. 90. And would therefore need no finishing touches ; is that right ?

A. I am not aware of their having put finishing touches upon their plates.

x-Q. 91. How about records made in the zinc plates which did contain the impurities spoken of ?

550 A. As far as I know, they were rejected.

x-Q. 92. What do you know about the rejection of zinc plates by the Berliner Company ?

A. I was present on one or two occasions when such plates were rejected because of defects of the zinc.

x-Q. 93. These defects were discovered after the record had been etched into them ?

A. Yes.

x-Q. 94. You spoke, some answers back, of "chemical erosion", do you mean etching ?

551 A. Etching.

x-Q. 95. Have you ever taken a record in waxlike composition having vertical irregularities and electroplated the same and then examined either the original wax record or the electroplate ?

A. I have not personally made the electrotypes of any records.

x-Q. 96. Your criticism of the comparison stated on page 2 of the specification of the patent in suit is drawn from theoretical considerations, then, is it not ?

552 A. No, my criticisms were made and drawn from my practical knowledge.

x-Q. 97. From your practical knowledge of the difference between a "Form" containing vertical irregularities and, on the other hand, a form containing lateral irregularities of uniform depth ?

A. From my practical experience with the reproduction of plates which have both lateral and vertical irregularities.

x-Q. 98. That is the same plate would have irregularities of both descriptions ?

A. Yes.

553 x-Q. 99. For instance?

A. For instance, a photo engraved plate.

x-Q. 100. I do not quite understand what you mean by a photo engraved plate. Would one example be a plate photo engraved from an ordinary photograph?

A. No; from a drawing in line; from a drawing or print in line.

x-Q. 101. That is, a picture of some sort?

A. A picture or design.

x-Q. 102. In such a photo engraved plate as you now have 554
in mind what function, if any, is involved in the comparative depth or shallowness of the irregularities?

A. Such portions of the picture or design as present fine gradations of light and shade produced by lines of either greater fineness or greater closeness—that is, fine lines very close together or fine lines further apart, or coarse lines at varying distances—would have the spaces between the lines shallower than the broad spaces or greater lights, that is to say, the broad spaces of lighter portions of the picture or design. That would present variations in depth. The con- 555
tours of the lines and their thickness would present variations in the vertical depth of the lines.

x-Q. 103. And why are these made so? What is the object in doing so?

A. To produce varying effects of light and shade or varying effects of the design.

x-Q. 104. If, in a blank space between two lines a hole should be made, so as to remove the material which does not rise to the level of the printing surface, would this have any effect upon the reproduction? 556

A. No; in printing an impression from it would have no effect.

x-Q. 105. Is not the object in having the blank spaces of different depths merely one of convenience?

A. No, the depths between very fine lines that are close together cannot practically be made much deeper than the spaces between them—than the width of the space between them—and do not require in practice to be anything deeper.

x-Q. 106. Would the slight variation of the depth of the

557 blank spaces, one way or the other, have any effect upon the impression printed from the electrotype?

A. Slight variations in the depth between the lines would not necessarily have any perceptible effect in the impression obtained from such electrotype.

x-Q. 107. In dealing with sound records having vertical irregularities, would a slight variation in the depth of the irregularities have any effect upon the audible reproduction of such sound records?

558 A. Yes.

REDIRECT EXAMINATION BY MR. EDMONDS:

Re-D. Q. 108. Then, is it your idea that, in the process of electroplating a matrix for duplication of sound records, there is no occasion for the variations which you say are harmless in electroplating?

A. There is not only no occasion for a variation but there is scarcely a possibility of effecting it.

559 Signature and certificate waived.

NEW YORK, August 14, 1905.

Met pursuant to agreement.

Present, counsel as before.

EDWIN A. PANCOAST, a witness called on behalf of complainant, having been duly sworn, in answer to interrogatories pro-
560 pounded to him by Mr. Edmonds, deposes and says as follows:

1 Q. What is your name, age, residence and occupation?

A. Edwin A. Pancoast; age 33; residence, Montclair, N. J.; occupation, recording expert for American Record Company at its New York laboratory, No. 241 West 23rd Street.

2 Q. Mr. Pancoast, is it true that a few days ago I asked you to take a disk of waxlike material, coat the same with a layer of finely powdered plumbago and cut or engrave a record groove of appreciable and practically uniform depth and having lateral undulations corresponding to sound waves, this being done by means of the lateral vibrations of a suitable

561 stylus; then to form by the usual and well-known electroplating process a matrix from this record, and then to press this matrix into a suitable material for the production of a sound-record for use on a reproducing machine ?

> Objected to as leading in form and as irrelevant and immaterial.

A. It is true.

3 Q. Did you do it ?

A. I did. 562

4 Q. State just what you did, putting the steps in their proper sequence.

A. I took a wax tablet, covered it with a coat of plumbago, and placed it on the turn-table of a recording machine, and made a record, a lateral-groove record, with a stylus as mentioned. After making it, I removed the tablet, cleaned it of superfluous plumbago and chips, and placing it in a proper electroplating bath I made a shell. Using this shell, I made a pressing from the same, called a record. The pressing is getting the reverse of the impression of the shell made. 563

5 Q. Do you mean that you used the shell as a die and pressed it into the material to form a record for reproducing purposes ?

A. I used the shell as a die or matrix and pressed it into this soft material, soft by heat, and made a record, as we do in regular commercial practice.

6 Q. Can you produce the electroplate shell ?

A. I can and do.

> Defendant's counsel offers in evidence the electroplate shell produced by the witness and the same is marked "Defendant's Exhibit Pancoast Electroplate." 564

7 Q. Can you also produce the tablet made from this shell, which you refer to as a "pressing" ?

A. I can and do.

> Defendant's counsel offers in evidence the record produced by the witness, and the same is marked "Defendant's Exhibit Pancoast Record."

565 8 Q. Did you test this exhibit record after the same had been made as detailed by you, and if so, with what result?

A. I tested it and it compares very favorably with our regular making, our regular recording.

9 Q. In making the original record, did you follow any line of procedure at all out of the common? I mean by that, did you follow any practice peculiar to the operation in hand and different from that commonly followed by you with respect to the means for making the record groove in the 566 waxlike tablet?

A. Yes, I did, in following the patent in the preparation of the wax tablet with graphite or plumbago.

10 Q. I am asking you more particularly as to the operation of the recording machine?

A. The recording is practically the same as the regular recording.

> The exhibits are objected to as irrelevant and immaterial.
>
> 567 Without waiving the objection to the answers already given or the exhibits, the cross-examination is made *de bene esse.*

CROSS-EXAMINATION BY MR. MASSIE:

11 x-Q. How did you apply the plumbago?

A. By sprinkling the surface of the wax tablet evenly.

12 x-Q. The plumbago was in finely powdered condition?

A. In finely powdered condition.

568 13 x-Q. Did you make use of a brush to spread the same or any burnishing machine?

A. At the first operation.

14 x-Q. I understand that you took a wax disk or flat tablet and sprinkled finely powdered plumbago evenly over the same. Is that correct?

A. Yes.

15 x-Q. Then what was the next step you took?

A. The first plumbago was brushed over lightly.

16 x-Q. With a fine camel's-hair brush?

A. Something similar.

17 x-Q. And then? 569

A. And then another layer. That was not anything but a brushing, very light brushing, and then the layer was sprinkled on just as I have said, evenly.

18 x-Q. And left there without any further treatment?

A. Left there without any further treatment.

19 x-Q. How thick was this second layer that was sprinkled on?

A. Perhaps a tenth of an inch.

20 x-Q. As to the consistency of this coating layer:—Sup- 570
pose you had blown at it sharply with a puff, could you have
blown it away?

A. Yes.

21 x-Q. That is, it was light and powdery, and there was no cohesion or consistency at all in the mass of this plumbago?

A. Cohesion to the wax.

22 x-Q. Cohesion of the particles of the graphite among themselves?

A. No; very little.

23 x-Q. You say that after making the record you cleaned 571
the tablet of superfluous plumbago and chips. What were
these chips?

A. Chips from the recording stylus.

24 x-Q. Chips of what material, I mean?

A. The wax tablet.

25 x-Q. What was the purpose of that coating of finely powdered, non-cohesive graphite?

A. I suppose it is to graphite the surface.

26 x-Q. What was the function of the first coating, which
you spread by means of brushing? Was that the same? 572

A. Yes, nothing more than the second; just to insure the thoroughness.

27 x-Q. In your answer to the next to the last direct-question, you speak of "following the patent;" at least, I so understood you. What do you mean by that? What patent do you have in mind?

A. I mean the patent—I perhaps should have said the directions of Mr. Edmonds, from which his directions were taken.

28 x-Q. I will ask the stenographer to read that same

573 direct-answer over to you carefully, and then request you to state exactly what you mean by it.

The answer is read by stenographer.

A. By that answer, "following the patent," I should have said "following the instructions of Mr. Edmonds;" that is equivalent to what I mean by "following the patent."

29 x-Q. You "should have said 'following the instructions

574 of Mr. Edmonds,'" but you *did* speak of "following the patent." What did you have in mind, what patent?

A. I really don't know the name of the patent. It is the patent which my experiments were proving.

30 x-Q. Do you mean Mr. Edmonds, as part of his instructions, handed you a copy of a patent for you to experiment upon? Is that it?

A. Yes.

31 x-Q. And did your experiments prove the patent?

A. Yes, I think they did.

575 32 x-Q. What other experiments, if any, did you make in proving this patent?

A. I don't know just what you mean.

33 x-Q. In proving this patent, did you make any experiments except those you named in your direct-examination.

A. No.

34 x-Q. Did this patent give directions how to apply the plumbago?

A. I don't think so.

35 x-Q. So that you did not receive from the patent any

576 instructions as to applying the plumbago?

A. No.

36 x-Q. Referring to the method in which you made these two exhibits just offered in evidence, have you ever made records in that manner before?

A. As a whole, no.

37 x-Q. I understand that in making this exhibit "Pancoast Record" the difference between what you did in obtaining your electroplate shell and the ordinary procedure followed by defendant, American Record Company, in obtaining its first electroplate shell, consists solely in the fact that you applied

577 the graphite before cutting the record in the wax; is that correct?

A. Yes.

38 x-Q. With this understanding, I will ask you again if you, or so far as you know, anyone connected with defendant, has made any other shells in that manner except the exhibit before us?

A. No, we have not.

SIGNATURE AND CERTIFICATE WAIVED. 578

Defendant's Exhibit Tainter Deposition.

CIRCUIT COURT OF THE UNITED STATES,

DISTRICT OF NEW JERSEY.

AMERICAN GRAPHOPHONE COMPANY, 579

vs. In Equity.

EDISON PHONOGRAPH WORKS.

WASHINGTON, D. C., May 4th, 1896.

Met pursuant to agreement at the offices of Pollok and Mauro, 620 F. Street, before REEVE LEWIS, ESQ., acting as special examiner by consent. 580

Present—PHILIP MAURO, ESQ., for complainant.
RICHARD N. DYER, ESQ., for defendant.

Counsel for complainant gives notice that he withdraws Claim 7 of Patent No. 341,288 from consideration in this cause.

Thereupon CHARLES S. TAINTER, a witness produced on behalf of the complainant, being first duly sworn, deposes and

File Graphophone

United States Circuit Court of Appeals

FOR THE SECOND CIRCUIT.

AMERICAN GRAPHOPHONE COMPANY,
Complainant-Appellant,
vs.
AMERICAN RECORD COMPANY,
Defendant-Appellee.

Suit on Jones Patent No. 688,739.

Brief for Complainant-Appellant.

PHILIP MAURO,
REEVE LEWIS,
C. A. L. MASSIE,
Counsel for Complainant-Appellant.

C. G. BURGOYNE, Walker and Centre Streets, N. Y.

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United States Circuit Court of Appeals

SECOND CIRCUIT.

AMERICAN GRAPHOPHONE COMPANY,
Complainant-Appellant,

vs.

AMERICAN RECORD COMPANY,
Defendant-Appellee.

BRIEF FOR COMPLAINANT-APPELLANT.

I.

Statement.

This is an appeal in equity from the decree of the Circuit Court (Judge HAZEL) dismissing the bill. The suit is for infringement of the Jones Patent No. 688,739, for production of sound-records. A suit on the same patent (American Graphophone Co. vs. Universal Co.) is before this Court on appeal from Judge HAZEL's decision (145 F. R., 636). The decision herein (145 F. R., 643) was based upon the conclusion reached by the learned Judge and set forth in his opinion in that case, namely, that the method described and claimed in the patent in suit did not involve "invention."

The important items of evidence are the same in both cases, but the testimony herein differs in some

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details from that in the Universal case, and presents material which strengthens our argument. Our brief herein will be addressed mainly to the matters which are peculiar to this case. We will, in particular, call attention to facts in view of which we ask a decree awarding three-fold damages.

Defendant in the Universal case made a full presentation of the prior art and of the defenses existing to this patent, omitting nothing pertinent. Special prominence was given to the patents, publications and inventions of Mr. Berliner. These are entitled to the foremost place in considering the question of patentability, for the reason that the manufacture of disk records, prior to the Jones Patent, was conducted entirely according to the Berliner etching process, and was carried on *solely* by the company (Victor Talking Machine Co. and its predecessors in business) which operated under the Berliner Patents. In other words, Berliner's was the only process of making disk records existing prior to that of Jones. The art to-day knows of but two disk record-making processes—namely, the Berliner etching process and the process of the Jones Patent in suit.

If the Jones process is to be compared with the prior art as that art actually existed in practice, the comparison would be confined to the Berliner Patents and publications. No other person had contributed anything to the production of disk sound records. But Berliner's inventions presented no anticipation of the patent in suit. Judge Hazel decided (145 F. R., 636, 638) that

> "the series of acts described in the Jones Patent produce a definite and useful result *essentially different* from that described in the patents to Berliner."

Furthermore, the defendant in the Universal case had introduced the Young British Patent and every other prior patent to which any importance is attached in the decision below. The record in that case is now

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before the Court, and its completeness will be apparent.

The Universal case was ready for hearing, was on the calendar, and was about to be argued, when counsel for the present defendant American Record Co., an utter stranger to the cause, applied to the Court below and asked that the Universal case be taken off the calendar and that the hearing thereof be postponed. The ground for this unusual request was the sworn allegation that counsel for this defendant had "an absolutely conclusive defense against the Jones Patent," or (as stated in the supporting affidavit), defenses **"wholly different from anything presented by the record made up in the Universal (Victor) case.**

Judge PLATT, before whom the motion was argued, believed these statements and granted the motion, in consequence of which complainant has suffered special damage, entitling it to special relief, it now appearing that the said statements were wholly unfounded.

The Universal case was to have been heard at the same time with the Victor Company's test case on the Berliner feed-from-the-record Patent, which this Court sustained in March, 1906 (145 F. R., 350). It was obviously to complainant's advantage to have had its test case tried at the same time with that of its competitor. Complainant has been deprived of this advantage, and also of a substantial part of the lifetime of the patent in suit, and has been put to unnecessary expense by false representations made to the Court by the present defendant.

In our *prima facie* proofs herein we introduced the proceedings before Judge PLATT, so that defendant was advised, during all the time its proofs herein were being taken, that the evidence introduced by it would be compared at the final hearing with its sworn representations made to Judge PLATT (see Compl'ts. Ex. 9, Deft's. Motion Proceedings, pp. 155–175).

The application to Judge PLATT was supported by the affidavit of one Cooley, who describes himself as "one of the active managing officials" of the defendant company, and the burden of his affidavit was that there were

> "other and very substantial defenses against the Jones patent which apparently are not even foreshadowed by the proofs in the Universal (Victor) case."

We also quote the following from said Cooley's affidavit:

> "As to *both these matters of defense*, the American Record Company is naturally unwilling, unless required by the Court, to be more specific at the present time, since a more detailed statement of new and additional defenses could only have the effect *of placing counsel for complainant on guard* as to matters which will be proved *in extenso* in the defendant's record in the suit against my company. I am, however, entirely willing to submit the matter privately to the Court, in order that it may be seen not only that there exist substantial defenses against the Jones patent, which should be brought to the attention of the Court at the first hearing of a suit designed primarily to establish that patent, but also that these defenses are *wholly different from anything presented by the record made up in the Universal (Victor) case.*" *(italics ours).*

The most important statement in the affidavit, and that which doubtless had the greatest effect upon Judge PLATT was this:

> "In addition to this, *we have discovered* what I believe should amount to *an absolutely conclusive defense* against the Jones patent, involving the question as to whether the alleged process of the Jones patent (whether such process be an invention or not) was in fact developed by Jones *or boldly purloined by him from a co-worker in the same shop.*" (R., p. 162).

This is a very serious allegation, and this charge of criminality against complainant's patentee was made for the express purpose of interfering with a judicial proceeding. Mr. Cooley, moreover, is a lawyer, and his name appears on the briefs as one of defendant's counsel. It is therefore due to the Court and to complainant that he and his business associates should be held to strict accountability for these charges and statements, seeing that they accomplished their intended purpose, and that thereby great damage was inflicted on complainant.

In the reply affidavits by complainant's counsel, Mr. Mauro and Mr. Massie, it was set out that Mr. Cooley, some time before his intervention in the Universal case, had been personally to complainant's president and counsel, had made to them the same statements that appear in his affidavit on file, namely, that he had discovered "an absolute and conclusive defense, the effectiveness of which was beyond question," and on the basis of that statement had demanded for his company a free license under the patent in suit (pp. 165, 166).

Mr. Massie, describing Mr. Cooley's attempt to procure a license under the patent in suit said (pp. 168, 169):

> "Mr. Cooley began by making strong representations as to the financial standing of the persons composing the American Record Company; and said that for a year past, they had been investigating the patent situation, and had obtained evidence which they had laid before several patent attorneys in various parts of the country who had been recommended to them as being specialists in the talking-machine line; and that each one of these experts has rendered an emphatic opinion that, upon the evidence submitted, the Jones patent here in suit (and the Macdonald Graphophone Grand patent, likewise owned by complainant) could not be sustained. Mr. Cooley further stated that there was *one absolute defense*

> *against the Jones patent that they had knowledge of*, but he believed it was not known to any one else. He further said that the American Record Company did not wish to break the Jones patent, and assumed that the American Graphophone Company had the same wish. Therefore, Mr. Cooley suggested that a perpetual license under the Jones patent (and the Macdonald Graphophone Grand patent) should be granted to the American Record Company. The latter, in turn, to make use of its good offices in reconciling the three different interests in this line, to wit, the American Graphophone Company, the Victor Talking Machine Company, and the American Record Company. He declined to disclose what the evidence was upon which he relied."

The following from Mr. Mauro's affidavit is also worthy of notice in connection with the suggestion that the defense in the Universal cases was a sham or half-hearted defense (p. 167):

> "The defense in this case (the Universal) is, in my opinion, exhaustive, and is in very competent hands. I am very familiar with this art, and with the history of this particular invention, and I know of nothing which could possibly aid the defense and which has not been presented. I believe that if the American Record Company has any matters of defense not included therein, they will be found to be *merely cumulative*. The Universal Talking Machine Company is in precisely the same position with respect to the patent in suit, and has precisely the same interest to defend against it, as the American Record Company. The Universal Company, like the American Record Company, has applied for a license under this patent in case it is sustained, and its request, like that of the American Record Company, has been refused."

We will find this to have been a perfectly accurate forecast.

Either the defendant, and specifically Mr. Cooley one of its "active managing officials," possessed knowledge of facts, which if true constituted a valid defense to the Jones Patent and which should put Mr. Jones in the penitentiary, in which case we will find those facts presented in the testimony herein; or else the active Mr. Cooley has attempted by a false threat to secure the property of complainant for the benefit of his company, and by a like false representation made under oath to the Court has interfered with the trial of a cause between third parties, incidentally reflecting upon the good faith of the latter.

The Court will be amazed to learn that in the testimony offered for defendant there has been no testimony whatever in support of the defense which Cooley solemnly swore "*we have discovered*," and with which he endeavored to extort from complainant a free license. Not only so, but *there has not been the slightest attempt to show the existence of such a defense. Neither are we given so much as an explanation of the failure to attempt by proof to support the outrageous charge brought against the patentee, Mr. Jones.*

Defendant attempted to meet this in the Court below by arguing that the matters referred to were presented by affidavit only. We reply that the important facts appear from Mr. Cooley's own affidavit, which, of course, defendant's counsel cannot question. As to the additional matters set forth in the affidavits of complainant's counsel, it is enough to say that these were put before defendant as part of our *prima facie* case, and its failure to deny or explain the matters thus presented is a sufficient admission of their truth. Even if these statements had been denied by Mr. Cooley, we think the Court would, nevertheless, give credence to them. Mr. Cooley's own affidavit, when compared with the proofs presented herein, is all that is needed to discredit him completely.

II.

Assignment of Errors.

The errors assigned (Rec., pp. 622, 623) are the same in substance as in the Universal case and need not be repeated here.

III.

BRIEF OF THE ARGUMENT.

Defendant's conduct witnesses to the novelty and importance of the invention.

The defendant company came into existence in the spring of 1904 (p. 316, Q. 6). **It was organized and exists for the sole purpose of making sound-records by the Jones process. It has no other business.** This is another fact tending to establish the patentability of the Jones process. Until that process became known there was no inducement to persons of a predatory disposition to manufacture disc records. *Now* the inducement is too strong to be restrained by anything short of a writ of injunction. One of the effects of the Jones invention has been to call into existence a crop of infringers (see Microphotographs, pp. 317-377 of Record in the Universal case).

Again, the conduct of defendant and its counsel is an admission that in their opinion the matters of defense presented in the Universal case were insufficient to defeat the patent. This defendant did not rely on these matters, but declared that it felt justified in infringing the Jones Patent because it knew of a *real* defense, one "not even foreshadowed." in the Universal case. This defendant also declared that because of its knowledge of this same defense it was justified in intruding into the Universal case with the demand that the hearing thereof be delayed until it could present the proofs of the "absolutely conclusive defense," known only to the active Mr. Cooley and his associates.

Finally, defendant's conduct shows that there can be *no question as to infringement.* Defendant was willing to be licensed under the patent, and admitted that, if valid, it would interfere with their operations. It was not until the failure of Mr. Cooley's attempt to procure a free license by threatening complainant with his pretended defenses that defendant addressed itself to the task of fighting the patent.

The proofs now show that Mr. Cooley's sworn statement of absolutely conclusive defenses discovered by him, "wholly different from anything presented by the record in the Universal (Victor) case," and "which will be proved *in extenso* in the defendant's record in the suit against my company" were absolutely untrue. No such proofs have been forthcoming, nor is there any explanation of their non-production, particularly in respect of the infamous charge brought against complainant's patentee.

We submit that, if the patent be sustained, it is a case for three-fold damages. If the patent be not sustained some other relief, such as the costs of suit in both Courts, should be granted.

The Defenses Herein. Mr. Greeley's Expert Deposition.

Defendant's case is presented by its expert, Mr. Greeley, and it consists of precisely the same defense as that in the Universal case, of which Mr. Cooley said disparagingly (p. 160)—

> "that the defense appears to come down almost wholly to the question as to whether or not the Jones process involved invention in view of the prior (published) art."

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The defense herein likewise "comes down" wholly to that question.

Mr. Greeley discusses the prior patents in the usual manner of an expert witness, and after his review thereof is constrained to admit that the Jones process is not disclosed in any of them. In x-Q. 50 (p. 360) he says:

> "I do not find in any one of the references referred to a full and detailed description of each and all of the steps taken by Jones following the obtaining of the original record in the wax-like tablet in the order directed by him, and as and for the purpose described."

Mr. Greeley further admits that the Jones process

> "has practically superseded the etching process, so far at least as the production of commercial records is concerned" (p. 354, x-Q. 28).

Mr. Greeley, however, gives it as his opinion that a "skilled mechanic," knowing all that the prior patents disclosed, would, or should, be able to put the right steps together in the right order to produce the Jones process and its result, and that he should be able to do so without exercising invention. Mr. Greeley's "belief" stated in his own words is (p. 338)

> "that the patent in suit discloses no novelty whatever *beyond what might reasonably be expected to be known* to the ordinary mechanic skilled in the talking machine and electroplating art."

The case being such that defendant's expert can put his proposition in no stronger terms than this, the Court can hardly do otherwise than hold that the defense of no-invention has not been established. What Mr. Greely says above could be said of any invention. Moreover, we submit that a patent should not be declared invalid on the ground of what "might reasonably be expected to be known" to a hypothetical skilled expert.

Again, Mr. Greeley says (p. 338):

> "I believe that such a mechanic, *if asked to cut a sound-record in a wax disc,* and to *produce duplicates* thereof of a permanent character, would have known how to and could have produced such records without the exercise of invention."

But what warrant is there for giving to the "skilled mechanic" the advantage of a direction "to *cut* a sound-record in a wax disc, and to produce duplicates thereof"? No one had ever thought of doing that so far as the evidence shows; and the conception of the idea is always an important part of the invention. But beyond that, if the idea had been thought of, the fact that it had never been done is conclusive evidence that there was some difficulty in the way of its accomplishment, the removal of which difficulty required invention.

To establish the defense of no invention, and to justify the Court in declaring void a grant of the Government, *particularly when that grant has been made after an examination by the Patent Office of the very matters on which this defense is based,* will require proof of such a nature as to impart thorough conviction to the mind. We cannot suppose that the unsupported speculations and conjectures of Mr. Greeley, as to what his supposititious skilled mechanic would have done under imaginary conditions, will serve any other purpose than to satisfy the Court of the correctness of the action of the Patent Office in holding that invention was exercised in bringing the Jones process into actual industrial existence, and in conferring its benefits upon the public.

We will refer very briefly to the patents on which Mr. Greeley comments, and will do so mainly for the purpose of pointing out that everything material was fully presented in the Universal case:

(1) *Berliner Patent No. 548,623.* This patent (and of course all that Mr. Berliner did) is fully set forth in the Universal case. It describes the etching process,

which is very different from that of Jones. The chief importance of this patent is that it discloses the *only method of making uniform depth records that was known to the world prior to the invention of the patent in suit.* It thus shows what a radical departure Jones made from the previous practice of the art.

Complainant's expert says (p. 64, Q. 4):

> " Directly, it has no bearing whatever upon the novelty of the invention set forth in the Jones patent, except that it contains statements showing that at that time Mr. Berliner thought that successful duplicates of zig-zag records could not be made by depositing a matrix directly upon a wax record of that form."

The patent relates exclusively to disks of zinc (or other material) " into which a spiral record of sound-waves is etched " (line 27, p. 1, printed spec., p. 235).

M. Berliner's deposition has been given in this case with that of his nephew and one time assistant (Mr. Sanders) and we are told by them something of the experiments carried on by him. Without at this point going into any detail, Mr. Berliner's experimental history becomes an important testimony to the patentability of the Jones process, because of the fact that, when Berliner's company learned of the Jones process they dropped the etching process though in so doing they had to infringe a patent. Had Berliner known of that process sooner, he would have dropped the etching process and applied for a patent on the other, *as he actually did when he eventually discovered the Jones process, several years after the latter had filed his application for patent.*

(2) *Adams-Randall British Patent No. 1058 of 1889.* This patent also figures prominently in the defense in the Universal case. It proposes the thoroughly impractical scheme of making a sound record in a layer of plumbago coated upon a substance which, while the record is being made, is in a *liquid or semi-liquid* state, and then making this record hard enough for

reproduction by depositing on the plumbago a layer of copper or other metal. The thing produced would be a metal surfaced record (see Cameron, p. 105, Q. 31).

(3) *Rosenthal & Frank Patent No. 474,410.* This patent also was fully discussed in the Universal case. It has nothing whatever to do with making copies of any sort of a sound record. It proposes scratching a zig-zag record in a zinc tablet. All that defendant's expert can make of it is that, if a wax tablet were substituted for the zinc plate, and the apparatus were operated, we would then have the *first step* of the Jones process (pp. 329, 330). To discuss such patents is a sheer waste of time.

(4) *Young British Patent No. 1478 of 1894.* This patent was the corner stone of the defense in the Universal case, and was also the foundation of the objections and arguments advanced by the Patent Office to the grant of the Jones Patent. Undoubtedly, this British Patent affords the basis for the best argument that can be made against the patent in suit. We have fully discussed it in our brief in the Universal case, and since Mr. Greeley pays but little attention to it we need not discuss it further.

(5) *Berliner's Franklin Institute Paper of 1895.* This publication likewise is in the Universal case. It relates to the etching process, and recounts some of Mr. Berliner's efforts to obtain better results by that process. It is of interest to note that, in this paper, Mr. Berliner speaks of attempting to use wax (not for engraving therein an uniform-depth record, but) for taking an impression of the etched record, and then electroplating on the wax impression. This (had it succeeded) would not have given to the world the Jones process. But it did not succeed, and Mr. Berliner referred to it in his paper merely to say that it was defective and why (" loss of surface and consequently of line work "). The paper shows that the result of this unsuccessful experiment was to lead Mr. Berliner farther away from the Jones process, namely, to the attempt to deposit a copper matrix on the zinc

original. Mr. Cameron treats this publication at length in his answer to Q. 33 (p. 109).

Mr. Greeley's "Skilled Mechanic" Proposition Tested by Actual History.

This Franklin Institute Paper affords an opportunity for testing the soundness of Mr. Greeley's opinion as to what a mechanic, skilled in the talking-machine and electrotyper's art would do. Mr. Berliner answers to that description.

One of defendant's contentions is that Jones' process may be regarded as merely the application to an uniform-depth engraved record, of a process well known in the electrotyper's art, and that such application would be an obvious thing to a skilled mechanic. Assuming for a moment that the proper conjunction of these two things would give us the Jones process, we have from Mr. Berliner's experience a most impressive evidence that the result of an attempt to apply the electrotyper's art to the duplication of sound records carried him, Berliner, *farther than ever* from the Jones' process.

Turning to Berliner's own comments on his Franklin Institute paper of 1895 (pp. 264-268), we find that after attempting to employ wax *in the way in which it is employed by electrotypers* (*i. e.*, to take an *impression* of an etched record, *not* for engraving a laterally undulating record) Mr. Berliner turned from it to the use of rubber softened by heat, finding (as recorded in his paper) that with the wax "there is a loss of surface and consequently of *line work*." The substituted plan of using softened rubber for the first impression, and wax for a second impression, seems not to have been satisfactory, for we read in the 1895 paper that "a more direct mode of matrix-making became desirable." Berliner thereupon took the unsolved problem with him to Germany and got the benefit of the experience of "*a very prominent electrotyping firm there,* who succeeded, after a number of failures, in producing most accurate copper matrices by a *direct deposition on zinc* plates. Their method consists in covering the zinc with electrolytic *brass*."

Mr. Berliner tells us that this simpler process followed immediately and displaced that in which the hard rubber negative was used. But this more direct method was in turn succeeded by a still " simpler method, which consisted in covering the zinc record with a very delicate layer of electrolytic copper " (p. 268, Q. 18).

This is very instructive. Mr. Greeley gives it as his belief that a skilled mechanic, with knowledge of the practice of the electrotyper's art, would naturally have employed the Jones process. But as a matter of real history, a person having the *best* existing skill and knowledge pertinent to the subject *actually attempted* to use wax in the way in which it is employed in the electrotyper's art. So far from suggesting the Jones' process, the experience of this " skilled " person led him first to adopt a process characterized by interposing the additional steps of taking a negative in hard rubber softened by heat ; and from that led him to the process of depositing electrolytic brass directly on the zinc record, *abandoning the use of wax altogether*, and finally led him to the adoption of a still simpler method, namely, that of depositing electrolytic copper directly on the zinc original. This latter process was the *ultimate development of Mr. Berliner's work*, and was the process used by him so long as he had charge of this part of the work for the Gramophone Co., *i. e.*, until 1898 (p. 269, Q. 22). *This was a year after the Jones application for patent was filed.*

Again, Mr. Greeley gives it as part of his belief that "such a mechanic" would obtain from the prior art all information necessary to put him in full possession and conscious understanding of the Jones Patent (pp. 338, 339)—

> " even if, aside from this prior art, and with nothing more than an *elementary knowledge* of the talking-machine art and the electrotyping art, he would not have *naturally and inevitably* adopted

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> as the *obvious procedure* for securing such sound records in permanent material the steps described in the patent in suit and set forth in the claims."

How much importance will the Court attach to any speculative opinion of Mr. Greeley in the face of the record contained in Mr. Berliner's 1895 paper! We learn here that the problem was turned over by him (who possessed more than an "elementary knowledge" of both arts) to "a *very prominent* electrotyping firm," and then what happened? Did they "naturally and inevitably," and without exercising invention or engaging in any experimentation, put the Jones process into operation? Not at all. They succeeded, and only "*after a number of failures*," in *depositing electrolytic brass directly on the zinc plate*. Again the knowledge of the art led *away from* the Jones process.

It is not often that we have the opportunity of applying such decisive tests to the conjectures of an expert witness touching what an imaginary skilled expert would do under assumed conditions.

We now proceed with the review of defendant's citations:

(6) Defendant's expert Mr. Greeley refers also to other patents, as Bell & Tainter, No. 341,214, British Patents to Gouraud (Edison) No. 12,593 and 15,206, which are also in the record of the Universal case. Thus it will be seen that the defense of no-invention is supported by the same proofs as were presented in the Universal case, which proofs are also the same as were passed upon by the Patent Office in deciding the patentability of the Jones invention. Setting all these aside, as having been sufficiently discussed for the information of the Court, we take up the new matters contained in the record herein, whereof the most prominent is a copy of a deposition of Mr. Tainter given about ten years ago in a suit then pending on the Bell & Tainter Patent, No. 341,214 (R., pp. 392-430).

(7) TAINTER'S DEPOSITION. This deposition was printed as part of a Court record in a case never

decided, and copies of the printed record were furnished to counsel (Stipulation, p. 362). We contend that this does not constitute a " publication " in the technical sense; but we will not stop here to discuss that point, because the subject-matter of Mr. Tainter's deposition is quite harmless to complainant. Whatever evidential value it has is distinctly in support of the proposition that the Jones' process has patentable merit.

This deposition was given by Mr. Tainter in a suit based on the fundamental Bell & Tainter Patent, No. 341,214, which covered broadly the process of engraving sound-records in wax-like material, and also the product of that process, to wit, an engraved sound-record. This great invention, which is the origin and basis of the enormous sound-recording industry of the present day, was the outcome of four years (1881–1885) experimental work on the part of the collaborators, Alexander Graham Bell, Dr. Chichester A. Bell, and Charles Sumner Tainter. The latter, in the deposition before us, opens a window of observation into the Volta laboratory, and affords us a glimpse of the vast experimental work which was there carried on at that remote period of time. The use which defendant's expert makes of this deposition is to hunt through the *abandoned experiments* of the Volta laboratory, and by selecting a fragment of one experiment here, and the fragment of another there, and putting them together, to produce something bearing a resemblance to the Jones process. Mr. Greeley's reference to the Tainter deposition is on pages 325–329 of the Record, and the substances of it is that the Volta associates, among an innumerable multitude of experiments, attempted to engrave zigzag records in various substances; that in a description lodged by them in a sealed package in the Smithsonian Institute in July, 1881, reference was made to engraving both vertically and laterally undulating sound-records; and that in the same description it was said that "a phonogram of either of these kinds may be copied in more durable material by any of the well known molding or electro-plating processes."

It is not, of course, pretended that there is here a description of the Jones process. The memorandum from which we have just quoted, stated what Bell & Tainter hoped or thought they could do in 1881, at the *very beginning* of their experimental work. Four years later, when they had reached the end of their experiments and came to make patent applications for what they *actually invented*, they were much wiser, and were able to speak more definitely. *They did not mention in a single patent the idea of engraving a zig-zag record.* That idea was wholly cast aside, and their description was confined strictly to the varying-depth record.

It thus appears that Messrs. Bell & Tainter, the creators of this art, had not been able to find, after four years diligent effort, any way of either directly reproducing from a zig-zag record, *or of copying it in a permanent material.*

Even if Bell & Tainter had experimented with, or in the direction of, the Jones process, and even if such unsuccessful experiments had been published prior to Jones' invention, the patent in suit would not be affected thereby; for where a matter rests in experiments which terminated short of actual commercial success, it is not available as anticipation of a patented invention. A patent is not defeated on the ground of anticipation unless what the earlier experiments did was sufficient to put the public "*in possession of the invention.*" "Until of practical utility the public attention is not called to the invention; it does not give to the public, that which the public *lays hold of* as beneficial" (*Howe vs. Underwood*, 1 Fish., 160).

> "It has often been laid down that a meritorious invention is not to be defeated by something which rests in *speculation or experiment*, or which is rudimentary or incomplete."
>
> Edison Elec. Light Co. vs. Beacon Co., 54 Fed., 670.

> "His efforts in that direction must be relegated to the class of unsuccessful and abandoned experiments, which, *as we have repeatedly held do not affect the validity of a subsequent patent.*"
>
> Supreme Court in Corn Planter Patent Case, 21 Wall., 181.

> "The utmost that can be said of the other patents set up by the defendants is that some of them may appear, *now that the Pusey invention is known*, to be suggestive of it, and that *by selecting parts from several of them*, and making but little change therein, the Pusey contrivance might be constructed. But this is not enough to defeat a patent."
>
> *Pusey vs. Schenck*, 71 Fed., 521.

It will be observed that the experiments referred to by Mr. Tainter, belonged not merely to the infancy of the art, but to its pre-natal history, and if the Jones process cannot be found in the patented and published works of the Volta associates, it is worse than idle to search for it in the scrap heap of their abandoned experiments and discarded ideas. Even if found there the discovery would not avail to defeat a patent by which a practical invention has been disclosed to the world.

This whole matter may be summed up by saying that Bell & Tainter so far from having invented the Jones process, *did not succeed in practicing successfully so much as the first step of that process.*

We confidently submit, therefore, that the information which the testimony gives us concerning the exhaustive experimental work of Bell & Tainter and the protracted experiments of Berliner, serves to accentuate the patentable merit of the invention involved in this suit. The fact that these inventors, searching long and earnestly for just such a process, failed to discover it, is evidence of the most convincing sort that, so far from being "obvious," its discovery was an achievement of unusual merit. We submit that great credit is due to an inventor who succeeded in discovering a process of such exceptional value, in a field which had been so diligently explored by the men whose experiments have been the subject of our discussion.

It is important for the Court to remember that this complainant owned all the Bell & Tainter Patents and inventions. This very deposition of Tainter was taken on behalf of the present complainant, and by complainant's present counsel. Although complainant and its experts had the benefit of *all* the experiments of Bell & Tainter, of all their ideas, and of the personal association of those inventors, *it nevertheless never came into possession of a practical disk record-making process of any sort until it acquired the Jones process.* This fact alone goes a long way toward proving that the Bell & Tainter inventions and publications had no effect whatever in the direction of bringing knowledge of the Jones process into the possession of the public.

We therefore submit that the only new item of evidence (Tainter's deposition) which this defendant has contributed to the case, serves to fortify the patent in suit.

Why the Jones Process Did Not Come Sooner into Use.

In our brief in the Univeral case we have discussed at some length the finding of the Court below that the Jones process was not used long ago because the makers of sound-records, and all others who desired to engage in that profitable manufacture, and who (on the theory of the decision below) understood the Jones process fully, were awaiting the expiration of the Bell and Tainter Patent. We have shown that this is a matter of *fact*, requiring ample proof before the Court is warranted in adopting it; and we have shown that there is not a particle of evidence supporting the finding, but that, on the contrary, the evidence thoroughly disproves it.

What is offered by defendant herein as evidence to support his explanation is the incompetent opinion of an expert. Mr. Greeley gives it as his opinion that the first step of the Jones process might have been held to infringe the Bell & Tainter patent, and he says (p. 341):

> "It is therefore not at all surprising that the talking-machine interests averse to the American Graphophone Company *should have refrained* from commercially utilizing what was a matter of common knowledge and of obvious adaptability to the disk branch of the art, in view of the fact that by so commercially utilizing such matters of common knowledge they would be subject to suit for infringement and injunction or damages."

We offer a few pertinent comments on this:

1. People do *not* behave that way under the circumstances stated. Generally they just infringe and stand the risk of a suit. The law reports and the records of this Court show that the Bell & Tainter patent was infringed down to the last hour of its existence, by people who were using *what it clearly describes.* The suggestion that anyone refrained, out of respect for this patent, from using a valuable process which it does *not* describe, for fear that *one step* of that process might be held to come within the scope of some of the claims, is so manifestly absurd as fairly to justify a doubt of the sincerity of those who advance it.

If, however, the supposed possessors of such valuable process were more scrupulous and more prudent than most persons of the present generation, and either feared or respected a possible dominating patent, they would certainly treat with the owner of the patent for a license under it. Or, if they were of another and much more common variety of business men, they might try for a license in the manner pursued by the active Mr. Cooley. They might do anything imaginable sooner than what Mr. Greeley suggests.

2. The Bell & Tainter Patent did not *bar*, but on the contrary *encouraged*, improvement, as witness the many hundred of patents subsequently issued and based upon it, and in which improvers patented every shadow of a shade of an idea that occurred to them.

3. The possessor of the Jones process in those years would doubtless have obtained legal advice to the effect that the first step thereof did not infringe any claim of the Bell & Tainter Patent, and that a claim which speaks of engraving a sound-record could not be expected to cover engraving a zig-zag record, when the description was absolutely confined to a vertically undulating record and vertically vibrating stylus. Indeed, the Tainter deposition could have been relied upon as showing that Bell & Tainter not only did not reduce to practice the engraving of a zig-zag record, but that they deliberately discarded and rejected all their attempts in that direction.

4. The complainant, the American Graphophone Co., was very glad to put this process into operation when it learned thereof from the patentee, Mr. Jones. Anyone who previously possessed the Jones' process, if unable to work it himself, would have done just what Jones did, offered it for sale to complainant. That company moreover, has in its service a large corps of " skilled mechanics," and certainly it did not refrain for ten years or more from using the Jones process out of respect for its own Bell & Tainter Patent.

5. Complainant's licensee, the Edison Phonograph Co., was not restrained by this patent from practicing the Jones process.

6. The Bell & Tainter Patent did not expire until 1903, yet it did not prevent Mr. Jones from making this invention and applying for a patent in 1897. It did not prevent Mr. Berliner from making the same invention and applying for a patent for it in 1900, and did not prevent infringements which began *as soon as the Jones process became known.* For example the suit against the Universal Co. was *begun* in January, 1902; and the Court will observe from the proofs in that

case, and from the nature of the process, that it was practiced for a long time secretly. The process lends itself to this, because it takes close expert scrutiny of the product, and knowledge of indications not discovered in a day, to detect the fact that the Jones process was used in making it.

7. The complainant, the American Graphophone Co., was itself the first to adopt and use the Jones process. Certainly that company was not waiting for the expiration of its own patent.

The conclusion of this whole matter is that complainant has been, by the decision below, deprived of the benefit of its patent on the strength of two guesses, both of which are unsupported by the evidence. The first guess is that there were persons who had knowledge of the Jones process as a complete invention before he invented it; and the second guess is that such persons refrained from putting their knowledge to practical use out of deference to the Bell & Tainter Patent.

Mr. Berliner's Deposition.

Incidental reference has already been made to Mr. Berliner's deposition, and little more need be said about it. He was a very willing witness, and gave all the aid in his power to defendant's theory that the Jones process was not patentable. Nevertheless defendant's counsel apparently thought it would have a good effect on the mind of the Court if it were made to appear that Mr. Berliner were subpœnaed as a witness. So his deposition begins thus (p. 262):

> "Q. 2. You are here to-day in obedience to a subpœna, are you not?
>
> "A. I was served a subpœna yesterday commanding me to appear here as a witness in this suit."

This is a very characteristic and judicious reply, from which the Court may, *or may not*, infer that the service of the subpœna was Mr. Berliner's reason for attending and giving his testimony.

Mr. Berliner attempts to explain away the fact that, as stated in his 1895 Franklin Institute Paper, he abandoned the attempt to use typographer's wax for taking a negative impression of his etched record. The published reason was "loss of surface and consequently of line work." The witness now says that "loss of surface" meant merely that the duplicate lacked the highly polished surface of the zinc original, and that it was merely a matter of *appearance.* It seems incredible that a mere matter of looks would cause abandonment of a process; but the untruthfulness of this explanation is apparent from the fact that it ignores the salient words "and consequently of *line work.*" It is the "line work" that is *everything* in a sound-record, and no amount of explanation can do away with the force of the words "loss * * * of line work." Mr. Cameron (p. 77) points this out, showing moreover that any loss of surface sufficient to affect the polish on the surface of the plate would cause "a radical and fatal variation from the original record." Mr. Cameron adds the following interesting bit of confirmatory evidence:

> "In this connection I observe that Mr. Berliner states that the records were commercially available because the sounds produced by them were very satisfactory and pleasing to the public who bought them. My experience with the records produced by Mr. Berliner's company at about and even subsequent to the date referred to, viz., 1896, leads me to a very different opinion from that expressed by Mr. Berliner as to the 'satisfactory and pleasing' qualities of such duplicates. In fact I distinctly remember upon one occasion, when I was engaged in operating a gramophone with some of these duplicates, Mr. Berliner himself came into the office and remarked upon the sadly defective character of the records, stating that he had,

however, some very superior records which he would be happy to place at our disposal. Acting on this suggestion he subsequently furnished some of these 'superior' records so that I had an opportunity to see what the gramophone was capable of doing as late as 1898 with records which were pronounced by its inventor to be of a 'superior' order. The reproductions from these records furnished by Mr. Berliner were exceedingly harsh, scratchy, and frequently so far out of tune as to render the recognition of the tune well nigh impossible. In fact, they were of such an inferior quality that it was an exceedingly unpleasant experience to remain in the room during their reproduction. They certainly disclosed 'a loss * * * of line work' of the most serious kind, and I can fully appreciate Mr. Berliner's statement contained in his lecture that 'a more direct mode of matrix-making became desirable.'"

Mr. Berliner makes some unimportant comments on the Jones Patent in suit, and in general acts as an expert witness for the defendant. He then enters upon a defense of the defunct etching process, the demerits of which we do not care to recall, for the greater its merit the greater still must be that of the process which displaced it.

On page 282, defendant's counsel endeavors to elicit from the witness a statement that the reason why he did not practice the Jones process was because of his deep respect for the Bell & Tainter Patent (see the grossly leading Q. 49). Inasmuch as Mr. Berliner does not pretend to have had any knowledge of the Jones process prior to the invention of the latter, it would be difficult for him to make such a statement. The reply of the witness reflects more credit upon his skill in the use of language than upon his candor and fairness. We ask the Court to note carefully the language of this witness, for if a "skilled person" would know the Jones process prior to the latter's invention, that process certainly would be known to this witness. He says (p. 283):

> "A. I cannot sufficiently emphasize this fact that in thoroughly recognizing the patents of Bell and Tainter, as taken out by able counsel of the American Graphophone Co., I felt that there was no use *in following up a method of* cutting a record in wax or other solid material, and as these patents had a great many years to run I did not follow up this method of making Gramophone records. But I always thought that whenever the Bell and Tainter patents would expire that the art of cutting a Gramophone record in wax would be open to everybody, and that the only patents standing in the way were the original Gramophone patents, which would expire only a few years after the Bell and Tainter patents had expired."

Berliner cannot assert knowledge of the process in question earlier than the Jones patent application, and one controlling reason why he cannot do so is because *he had an opportunity to prove earlier invention and so secure the patent for himself.* Instead of offering the above equivocation to the Court, a *fair-minded* man would have replied that the question utterly and absolutely misrepresented the facts, and a *clear-headed* man would have realized that this was evident upon the face of things.

Finally, Mr. Berliner endeavors to impair the evidential value of his action in filing an application for the process in dispute in 1900, and of the interference which thereupon resulted, and in which Jones was adjudged to be the prior inventor. In order to accomplish this object he says (speaking of the year 1900, when he filed his application, p. 286):

> "I felt in my own mind not only that such a process could not be employed at that time without infringing the Bell and Tainter patents, but

> that, moreover, *the whole combination of processes involved therein was not patentable*, or that if such a patent should be issued that it could not be sustained in the courts."

It is evident that Mr. Berliner either did regard the process in suit as being, in the year 1900, novel and patentable, and that he was justly entitled to a patent for it, or that, in filing his application for patent in that year, he perjured himself. In one case his application oath was false ; in the other the above-quoted statement is false. Under cross-examination, Mr. Berliner has a bad half-hour trying to square his application oath with his present statement, but we need not go into this. The present alleged views of the witness, and what he now says he felt in his own mind in 1900, are of no earthly importance. His *actions* are what count, and his attempts to explain these away will not enhance his reputation with any one who may read of them.

Defendant's Witness Sanders.

Sanders is Berliner's nephew, and was in and out of the laboratory in the year 1893, at which time he was about 13 years of age. He was at that time going to school nearby (p. 308, Re-d. Q. 80). He was abroad from 1894 to 1896, and thereafter was again employed in the laboratory until about 1898. Sanders gave a direct deposition of no importance whatever. The only thing mentioned by him which approached in any way the Jones process was an alleged experiment in making cut *metal* records in 1893 or 1894, prior to his going abroad. He says that some of these cut records were hanging on nails and on shelves in the laboratory when he returned in 1896, at which time Mr. Joseph W. Jones (the patentee) was an employee of the laboratory. This fact, if it be a fact, has no bearing on the case.

It must be remembered also, that Berliner never made, even experimentally, a record by means of the

Jones process prior to Jones' invention, and does not pretend even to have thought of doing so prior to that time. Cross-examining counsel misunderstood the witness' answer to Q. 29, in which he used the words "cutting in wax and then making a matrix from this"; and on cross-examination, the witness was asked to describe in detail the procedure he followed in cutting a lateral record groove *in a wax tablet*, and using this record to produce a matrix (x-Q. 31, p. 300).

The witness' answer 29, in which he said "I refer to the cutting in wax and then making a matrix from this," related to *present practice* and not to previous experiment. Nevertheless, the witness, answering the above cross-question, not only gives a glib description of the Jones process, but says "This was done about 1898, but we made some films on brass plates as early as 1893" (whatever that may mean). 1898 is later than Jones' invention, and we therefore disregard that part of the answer. Following this up, in answer to x-Q. 34, the witness describes a procedure resembling that of the Jones' process, and says it was done in 1893. He went abroad in 1898, to establish record-making plants and the process he established was "the etching process" (x-Q. 58, p. 304). Finally he was asked (p. 307):

> "x-Q. 74. You were asked in direct examination, Questions 10 and 11, whether you knew of any method observed in the Berliner laboratory prior to 1896, other than the etching method. Why did you not, in answer to that question, mention the operation described in cross-question 34?
>
> "A. Because I did not think of it until it was brought out by the cross-examination of Mr. Lewis.
>
> "x-Q. 75. You had forgotten all about it up to that moment, had you?
>
> "A. Yes, sir. I could not place any dates on this until my thought struck on Mr. Wilson showing me these things, and not having worked with

> Mr. Wilson after that date of 1893, I placed the whole situation and conditions without trouble. In fact, the whole *thing flashed through my mind very suddenly, and I saw all the machinery and old laboratory right before me.*"

It is quite unimportant, even if true, that the Jones' process was tried or used experimentally in Berliner's laboratory in 1893. But of course, it is not true, for otherwise Berliner would have mentioned it, and would have proved it in his contest with Jones in the Patent Office. A person who is liable to have things flash through his mind as suddenly as that, and to see all the machinery and old laboratory before him on so slight provocation, including a vision of what had no existence at the time, is not to be trusted as a witness. His mental condition should be a matter of solicitude on the part of his family.

The witness had not forgotten what was done in 1898.

> "x-Q. 77. The circumstance that this was done in 1898 had not escaped from your memory, had it?
>
> A. No, sir, it was while describing this the other *flashed* through my mind."

We merely wish to observe that this could not have been the basis of Cooley's charge that Mr. Jones boldly purloined the invention from a fellow workmen, because the flash had not occurred in what Mr. Sanders is pleased to call his mind at the time the Cooley affidavit was executed.

Defendant's Witness Levy.

Mr. Levy is a "photo-chemist" and was called as an expert in electrotyping. He tells how wax is used in that art as a "molding material" (p. 367) to "take an impression" of the thing to be copied, and how it is used in a "toggle press," and then covered with plum-

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bago, which is "just thrown over by the hand in some cases" (p. 368), and after electrotyping the metal shell is *levelled up* by being "*hammered out from behind*" (p. 369). All this tends to make it clear why others, including Berliner's "very prominent electrotyping firm" in Germany were, by their knowledge of the electrotyper's art, turned in a direction *away* from the Jones process. It also shows how utterly preposterous is the suggestion that Jones' process consisted in the mere application of the electrotyper's art to a particular kind of sound-record. We also remind the Court in this connection of Mr. Berliner's experience when he attempted to apply the electrotyper's method to his etched record.

Mr. Levy indulges in some unimportant criticism of the patent in suit (p. 373); and then he is asked some questions touching the sound-recording art, giving him an opportunity (of which he fully availed himself) to display monumental ignorance of the particular matters in that art which he had specially examined. In answers to x-Qs. 36–38 he talks arrant nonsense, and further on he declared that the vibrations of the Graphophone Grand, *which he had investigated and reported on for the Franklin Institute*, were *lateral*, and that the small-sized cylindrical records were also lateral (x-Qs. 43–47); and he further says that "disc records were made at that time [1899] *in wax laterally* and in zinc *by engraving*" (x-Q. 48 and x-Q. 51). We think it unnecessary to pursue Mr. Levy any further. Mr. Cameron has pointed out and corrected some of his extraordinary mistakes (Qs. 11–13, pp. 82–86).

The Jones Process is a Unit.

In order to secure a foundation at all for the defense it is necessary to adopt the view that the invention should not be regarded as a unitary process. If the express terms of the claim and the actual procedure be arbitrarily disregarded; and if the first step of the process be cut off from the succeeding steps and viewed as being not an act or operation at all, the way will be prepared for an attack on the patentability of the invention. If the process be regarded as unitary, and as consisting of all the steps enumerated in the claim, its novelty is beyond question. The first step of the Jones' process is cutting or engraving a record-groove "by lateral vibrations of a stylus"; and the success of the result *depends absolutely* upon this step. Though every subsequent step be performed precisely as stated in the claim, the result (which constitutes the valuable thing to both parties and to the public) will not be secured unless the first step be as set forth. Thus we have a very clearly defined industrial *process*, which is distinguished from all that preceded it *by precisely that feature to which its value is due.* The new departure is the essential and valuable part of the process. But defendant asks the Court to disregard all this and to look at the essential first step as a *thing done*, and not as *the doing* of a thing. This arbitrary and erroneous view of the Jones' invention has a great merit in defendant's eyes, namely, that they can then say that the other steps of this Jones' process (with the head thus decapitated) was an old process (or part of an old process) and that all that Jones did was to employ a particular sort of sound record in this old process. From this premise it is then argued that it does not make a new *process* to apply an old process to a known article to which it had not previously been applied.

This argument breaks down at each stage.

1. The cutting of a sound-record by lateral vibrations is just as clearly an *act* or *operation*, susceptible of being a part of an industrial *process* as the thing formed thereby (a uniform-depth engraved record) is an *article or product*, capable of being part of a new combination of elements. It is quite clear that an inventor might (as Jones did) give existence to a new industrial *process* by using the act of engraving by lateral vibrations, in connection with other steps or operations; and it is also conceivable that he might have given existence to a new physical *thing* (article,

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or product) by combining the engraved uniform-depth record with other physical structural elements.

It happens in this case that the new and useful invention is a *process*, and is described and claimed as such. It consists in a new way—"an act or series of acts,"—of arriving at a desired result, rather than in some novel structural feature of the thing produced. It is simply inconceivable that the Court will put these facts aside and treat the case as if the conditions admitted only of an improvement in an article or product. What Jones invented, and what was patented to him in the patent in suit, was an industrial *process*. Whether at the same time he made, or might have made, a patentable improvement in disc sound-records, is wholly aside from the subject.

But furthermore, the remaining steps of the Jones' process, after the proposed description of the essential first step, do not constitute an old process, or a *complete process at all*. The operation of making an original record is, in every case, an essential part of a process of making commercial sound-records. Not only so, but the nature of that first step affects vitally, not alone the ultimate product, but also every succeeding step. All this was well discussed and considered when the Jones application was pending in the Patent Office. The argument amounts to the proposal that the Court should disregard the claims of the patent and the kind of invention which was actually made, for the sole purpose of destroying the patent and presenting the use of the invention free to infringers.

2. But even should we consent to view Jones' invention (as does defendant's expert when he remembers the theory of defense) as being the mere application to an *engraved uniform-depth* record of a process which had therefore been applied to a uniform-depth *etched* record, or to a variable-depth *engraved* record, we have by no means reached the coveted conclusion that the patent is void for lack of patentable invention. It may (and in this case *does*) make all the difference in the world in a process and in its result,

whether it (the process) be applied to one thing or another. We need not go far for apt and decisive illustrations. In the case of *Crane vs. Price* the hot-blast process, applied to anthracite coal instead of to bituminous coal, gave the world a new and patentable *process*. In *U. S. Mitis Co. vs. Midvale Co.* (135 Fed. 103) the application ot a bit of aluminum to molten iron instead of molten nickel, gave the world a new industrial *process*. In *Carnegie Co. vs. Cambria Co.* (185 U. S. 403) the application of a large sized (instead of a small sized) holding reservoir, in an otherwise old operation, gave the world a new industrial *process*. These illustrations might be multiplied *ad infinitum*, but surely it would be superfluous in order to meet an attack so manifestly unmeritorious. The mere matter of the form chosen for the definition of an invention is of very little importance. If an invention *has been made* and the benefits thereof are apparent, it matters little whether it be defined as an improvement in process or as an improvement in product. But in the present case there can be no doubt that what Jones invented was, what his patent describes and claims, namely, a new *process* of making uniform-depth sound-records.

3. But here again we see the artificiality and insincerity of the defense. When defendant's expert escapes from the constraint of a "plan of defense," under which he must be careful to disregard the true character of the first step of the Jones process. and permits himself to speak naturally of things as they really are, he recognizes the Jones' invention as a *process*. In his long answer to Q. 9 (p. 343 *et seq.*) he compares complainant's *process*, defendant's *process* and the *process* of the patent in suit. These are to him (as to everyone who is not operating a "scheme of defense") "the several *processes*" and he starts off by saying:

> "The FIRST STEP *in all of these processes is the same.*" And what is that "first step" in all three processes? "CUTTING A ZIG-ZAG RECORD IN A WAX DISC."

And so he continues speaking in a way so natural that we almost forget his character as "expert," referring repeatedly to "the process of the Jones' patent," and saying again that—

> "Comparing the several *processes*, it will be seen that the *first* and second *steps* are the same in *all three processes*."

Yes, we think that the Court will see that quite clearly, and, notwithstanding Mr. Greeley's labored effort, in another part of his deposition, to make it appear that "the first step" in the process is not a "step" at all, and not even a part of the "process."

Patentability Discussed on Theoretical Grounds.

The *facts* decisively settle the question of patentability in the affirmative. Defendant opposes these facts solely by theoretical considerations. Starting with the new invention described in the patent and practiced under its protection, the defendant's expert embarks on the search for an analogy, and it is a very poor expert who (whatever the invention or its merit may be) returns empty-handed from such a quest. To bring into existence a new industrial *process*, thereby enriching mankind, is an achievement of one sort, calling for the exercise of *invention*, whether the inventor creates the process by devising entirely new steps, or by putting together for the first time steps severally old. To take such new process after it has been made public, and to find an analogy to it among what previously existed, is an achievement of a very different sort, requiring merely a little ordinary information and industry. This sort of undertaking has been aptly described by the Supreme Court as "the wisdom which comes after the fact" (*Carnegie Co. vs. Cambria Co.*, 185 U. S., 403). We shall not occupy much time or space in the discussion of the theoretical considerations proceeding from that sort of wisdom, but we venture to say that the patentability of the invention can be demonstrated (as was done to the satisfaction of the Patent Office) without any reference to the decisive facts of commercial results.

In order to give Mr. Greeley's position fairly, we quote his conclusion in his own words. He says (p. 340) that

> " a mechanic skilled in the talking-machine art and the electroplating art as it existed prior to the date at which the patentee Jones claims to have made the invention of the patent in suit, would have known how to produce permanent records in precisely the manner described in the patent in suit, and that such manner of producing permanent records would have been to such a mechanic the *obvious way* of doing this."

It is difficult even to discuss such an assertion as this in the face of the admitted fact that those skilled in the arts referred to never did (prior to the Jones Patent) " produce permanent records in precisely the manner described in the patent in suit." We cannot conceive how the quality of obviousness can be said to have resided in " such manner of producing permanent records," when in fact nobody thought of doing it. Finally, it is difficult to see (and here Mr. Greeley gives us no help) how this assertion is to be tested, and how it can be accepted as *judicially demonstrated* in the absence of any facts to support it.

The more probable view of this matter, as we submit, is that the more information the imaginary " skilled mechanic " might have had, the less likely would he be to think of attempting to make a sound-record by the method described in the Jones Patent. The more he knew of the idea of engraving a uniform-depth sound-record, and of the experiences of experimenters (such as Bell & Tainter) with that idea, the more confirmed would he be in the belief that the act of engraving such a record in wax-like material was absolutely useless for any purpose. The more he knew of attempts to electroplate sound-records in general, and wax-records in particular, the more likely he would be to turn away from all electroplating methods. The unsatisfactory results of such methods when applied to the favorable zinc record and the absolute failure of such methods for all other purposes, would not be calculated to invite farther experimentation in that field. There was absolutely *nothing* in the art, assuming our " skilled mechanic " to have had all the information contained in it, which would suggest that, by combining the useless step of engraving a laterally undulating record in wax-like material, with the (up to that time) impractical suggestion of graphiting, electroplating and pressing a wax record, there would come into existence a process endowed with merit capable of revolutionizing the art.

Further arguments based upon theoretical considerations, and all tending with more or less force to show that the character of the Jones' process precludes the supposition that it was obvious *a priori*, were presented in the course of the Patent Office proceedings, and we do not feel warranted in adding to the length of this brief by repeating them here. We shall urge only one other argument of this sort, and we do so because we think that, even if we did not have the decisive facts of commercial results, it would suffice to establish our contention.

The basis of this final argument is the fact that a laterally undulating (or uniform-depth) engraved record, *unlike a varying-depth engraved record*, requires from its very nature *to be connected with other operations before it can be of any practical use.* In itself it is incapable of employment as a sound-record, since the thin walls of wax would not withstand for a minute the lateral thrust of a reproducing stylus. Hence the act of engraving a uniform-depth record cannot have an actual existence as a practical and available thing, *except it be connected with other succeeding steps*, which shall constitute a process as a whole and carry the operation on to a result which the public is able to use.

Thus on purely theoretical grounds, if we were confined to these, the question of patentability must be answered in the affirmative. Who could say *a priori* that the step of engraving an uniform-depth record—incomplete and worthless in itself—could be fitted into (or onto) *any* other steps or series of steps so as to obtain a commercial result? Manifestly no one could say so. Only an inventor would think of it, and *his thought would need to be subjected to practical test, i. e.,* "reduced to practice," for every pertinent bit of information in the art would contradict the idea. And who could say, *a priori*, that the other steps, which, when fitted to this useless first step, would make a commercial process, were *the previously unsuccessful attempts at electroplating and pressing wax records?* And when all this is thought out, perfected in its details, demonstrated, comprehended by others, and its value estimated and brought to notice, what man—be he judge, patent expert or counsel—can adjudge that, in all this no invention was exercised, but that all was obvious to and in the conscious possession of every "skilled mechanic?"

Authorities on Patentability.

In addition to the authorities cited in our brief in the Universal Co.'s case, we call attention to the following pertinent decisions:

Star Brass Works vs. General Electric Co., 111 F. R., 398, 400 (C. C. A.):

> "It may be true that Anderson has only taken the familiar contact spring or brush, and placed it in a protected position, but this change seems to have made the difference between a defective mechanism and a practical method of attaining the desired end. Where, as in this case, the departure from former means is only small, yet the change is important, the doubt as to whether the inventive faculty has been exercised is to be weighed in view of the fact that the device in question has

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> displaced others which had previously been employed for analogous uses, and this may decide the issue in favor of invention."
>
> Citing :
>
> *Krementz vs. Cottle Co.*, 148 U. S., 556.
> *Consolidated Co. vs. Detroit Co.*, 47 F. R., 894.
>
> "It is a fact entitled to serious consideration in determining whether Anderson's improvement was so obvious as to be one which would occur to a mechanic skilled in the art that Van Depeole, with his conceded skill, did not attain the desired end."

In *Krementz vs. Cottle Co.* (148 U. S., 556) a situation similar to the case at bar was presented. The invention was a very simple one, namely, a collar button formed from a single piece of sheet metal. The Circuit Court had decided that in view of prior patents, one of which showed a stud fastening made from a single piece of sheet metal, that the modifications made by the patentee could have been made "without exercising invention, and by applying the ordinary skill of the calling."

The Supreme Court reversed this decision saying:

> "The view of the Court below, that Krementz's step in the art was one obvious to any skilled mechanic, is negatived by the conduct of *Cottle, the president of the defendant company*. He was himself a patentee under letters granted April 16, 1878, for an improvement in the construction of collar and sleeve buttons, and put in evidence in this case. In his specification he speaks of the disadvantages of what he calls "the common practice to make the head, back and post of collar and sleeve buttons separate, and to unite them by solder." His improvement was to form a button of two pieces, the post and base forming one piece, and then soldering to the post the head of the button as the other piece. Yet, skilled as he

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> was, and with his attention specially turned to the subject, he failed to see, what Krementz afterwards saw, that a button might be made of one continuous sheet of metal, wholly dispensing with solder, of an improved shape, of increased strength, and requiring less material."

Comment was not needed to show the applicability of this test to the present case or to point out that the difference between the facts of one case and those of the other are all in favor of the invention of Mr. Jones. He was dealing with problems far more obscure and perplexing than those which attend the making of a collar button; and, on the other hand, the testimony borne by Mr. Berliner and his company to the novelty and patentable merit of the Jones invention is much more forcible than the testimony of Cottle and his company to the invention of Krementz.

Further the Supreme Court in that case said:

> "It was also made to appear that the advantages of the new button were at once recognized by the trade and by the public, and that very large quantities have been sold."

Here we have the more cogent evidence of the fact that Jones' process has completely displaced the process formerly used and has taken possession of the entire field.

The Supreme Court cites a number of cases supporting the conclusion that:

> "When the other facts in the case leave the question of invention in doubt, the fact that the device has gone into general use and has displaced other devices which had previously been employed for analogous uses, is sufficient to turn the scale in favor of the existence of invention."

One of the cases cited was *Topliff vs. Topliff*, 145 U. S., 156, where the invention in controversy was referred to by the Court in the words "Trifling as this deviation seems to be." The Court in that case said:

> "While the question of patentable novelty in this device is by no means free from doubt, we are inclined, in view of the extensive use to which these springs have been put by manufacturers of wagons, to resolve that doubt in favor of the patentee, and sustain the patent."

We say (adopting the concluding words of the Court in *Krementz v. Cottle*), "We think, therefore, we are within the principle and reasoning of these cases" in affirming the patentable character of Jones' invention. Indeed we are utterly at a loss to conceive of any reasons that could be advanced for denying to the patent here in suit the benefit of the conclusions which are uniformly held, by the highest judicial authority, to follow from the undisputed facts of this case.

Infringement.

There is no ground for a dispute as to infringement. Complainant's Exhibits 7 and 8 are specimens of defendant's manufacture. Complainant's expert (Q. 6, p. 21) testifies and proves that these were made by the Jones process.

Defendant's witness, Prescott (p. 315) testifies that defendant's records are made by first preparing a "flat disk of wax-like material" on which "a zig-zag record is made by well-known means." This is covered with graphite, an electrotype matrix is deposited thereon, copies of this matrix are multiplied by electro deposition, and the commercial sound-record is formed by pressing one of these matrices into suitable plastic material (p. 316, Q. 8). That this is the Jones process is not seriously open to dispute; but if defendant wishes to give the most striking possible proof of lack of sincerity in the defense it can do so by disputing that it infringes the patent in suit. The Court will hardly have patience with the suggestion that defendant sought a license under, and intervened in a suit involving, a patent which it is not using. Nevertheless, since there are indications in this deposition of Prescott, and in that of Mr. Greeley, that defendant does propose to dispute the fact of infringement, a brief reference to these indications may be desirable.

It will be observed that in the Jones specification nothing is said about making a *plurality* of matrices, since that is a mere matter of manufacture, depending on the number of sound-records desired. The *invention* ends with the production of *one* matrix ; and when the inventor has told how to obtain this, the manufacturer can make as many copies of it as he may need in his business. To do this plainly involves no departure from the patented process. It appears from the depositions of Prescott (p. 315), Manwaring (p. 313) and Emerson (p. 131, x-Qs. 16–19) that manufacturers commonly make a number of matrices for stamping. This is sometimes done by taking several electrotypes from the original wax record (Emerson) and sometimes by making several copies of the first electrotype (Prescott).

Defendant's expert, in Q. 9 (p. 343), undertakes to compare these commercial processes with that of the patent in suit, and it will be observed that he does not bring himself to say that the commercial processes do not employ the process of the patent in suit, or to deny in the smallest particular the testimony of Mr. Cameron on the subject of infringement. Whether or not counsel for defendant will undertake to argue non-infringement is interesting merely for the further indication it will afford as to the character of the defense.

In rebuttal, Mr. Cameron testifies (Q. 40, p. 117) that the making of a plurality of matrices is not a departure from (but rather a more abundant carrying out of) the process in suit ; and that it is quite immaterial whether the stamping of the duplicate is done by the first matrix, or by a copy or replica thereof. The result both as to procedure and product is precisely the

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same. This is too obvious to stand in need either of evidence or argument.

We ask that the decision below be reversed and the cause remanded to the lower court with directions to enter the usual decree for complainant with three-fold damages as prayed above.

September 27, 1906.

Respectfully submitted,

PHILIP MAURO,
REEVE LEWIS,
C. A. L. MASSIE,
Of Counsel for Complainant-Appellant.

ward. Old ideas and suggestions, however, which are found in prior publications, were used to produce the better result. This achievement did not involve the ingenuity of an inventor, but comes within the limits of the skilled in that class of workmanship. What the patentee accomplished is thought to fall within the rule laid down in the following cases: Locomotive Works v. Medart, 158 U. S. 68, 15 Sup. Ct. 745, 39 L. Ed. 899; Smith v. Nichols, 88 U. S. 112, 22 L. Ed. 566; Pennsylvania R. Co. v. Locomotive Co., 110 U. S. 490, 4 Sup. Ct. 220, 28 L. Ed. 222.

Inasmuch as the proofs satisfy me that the patent in suit is anticipated by the prior art, it follows that the bill must be dismissed, with costs.

AMERICAN GRAPHOPHONE CO. v. AMERICAN RECORD CO.

(Circuit Court, S. D. New York. February 19, 1906.)

PATENTS—ANTICIPATION—PRODUCTION OF SOUND RECORDS.

The Jones patent, No. 688,739, for a method of producing sound records for talking machines, is void for anticipation in the prior art.

In Equity. On final hearing.

Elisha K. Camp (Philip Mauro, Reeve Lewis, and C. A. L. Massie, of counsel), for complainant.

Samuel Owen Edmonds, for defendant.

HAZEL, District Judge. This suit in equity relates to the Joseph W. Jones patent, No. 688,739, granted December 10, 1901, for "production of sound records." Complainant is owner of the patent by assignment. The defendant challenges the validity of the patent and denies infringement. This case was argued before me and submitted at the same term of court at which the action involving the same patent, entitled "American Graphophone Company against Universal Talking Machine Manufacturing Company," was heard and submitted. In the argument one case followed the other; the Universal Company case being argued first. In that case, I have to-day handed down an opinion (145 Fed. 636) holding that the involved claims, two in number, were anticipated by the prior art as appeared by the patents of Adams-Randall, of 1899; Gouraud, Nos. 12,593 of 1888 and 15,206 of 1891; Edison, No. 382,419 of 1888; Young, No. 1,487 of 1894; Bell & Tainter, No. 341,214 of May 6, 1886; Berliner, No. 548,623. For the reasons there stated, the bill is dismissed, with costs.

AUTOMATIC RACKING MACH. CO. v. WHITE RACKER CO. et al.

(Circuit Court, N. D. Illinois, E. D. February 2, 1906.)

No. 27,966.

1. PATENTS—CONCLUSIVENESS OF DECISION OF PATENT OFFICE—SUIT FOR INFRINGEMENT—ESTOPPEL TO DENY VALIDITY.

The defeated party in an interference proceeding in the patent office, which involved only the issue of priority of invention, is not estopped by

It is unnecessary to enter upon an elaborate discussion of the question of infringement of these claims, for the reason that each has as an element a rock-shaft. In the sixth claim it is "a rock-shaft journaled in bearings parallel with the feed-rack to be rocked in a direction transverse thereto." In the eighth claim it is "a rock-shaft nearly parallel with the rack wholly independent of the ordinary feed rock-shaft."

There is no such rock-shaft in the defendant's tabulator.

Infringement is predicated of the assumption that the simple lever of the defendant's device, which we have already held to be the equivalent of the stop-rod lever of the first patent, is the rock-shaft of the second patent or an equivalent therefor.

This assumption is based upon an ingenious argument of the complainant's expert, where, by a process of exclusion and transposition, aided by a vivid imagination, he transforms the swinging pivoted lever of the machine into the rock-shaft of the patent. In other words, the argument amounts to an attempt to show that a rock-shaft might be substituted for the lever in defendant's machine.

Such an argument would hardly be permissible were we concerned with a broad, fundamental patent, but in a patent strictly limited to a specific construction it is wholly irrelevant. Gathright obtained his second patent because he convinced the Patent Office Officials that he had made an improvement on the mechanism of the first patent; and we are now asked to hold as an infringer one who does not use the improvement. This cannot be done.

It follows that the decree is affirmed as to the second Gathright patent and reversed as to the first without costs of this court, and the cause is remanded to the Circuit Court with instructions to enter a decree in conformity with this opinon, without costs.

AMERICAN GRAPHOPHONE CO. v. UNIVERSAL TALKING MACH. MFG. CO.

SAME v. AMERICAN RECORD CO.

(Circuit Court of Appeals, Second Circuit. January 14, 1907.)

Nos. 87, 94.

1. PATENTS—INVENTION—EVIDENCE.

Where an existing process or device discloses what appear to be insuperable objections to practical operation, it is persuasive evidence of invention that an improver has the foresight and courage to break away from such disclosure and conceive of some new method involving a different principle; but it is also evidence of invention if one, by taking a step forward, sees that what appeared to be barriers to progress are mere obstructions to side paths and byways, and that the road to a practical invention lies straight ahead.

[Ed. Note.—For cases in point, see Cent. Dig. vol. 38, Patents, §§ 16, 17.]

2. SAME.

Where the question of invention is still left in doubt after the application of the usual negative tests to establish want of invention, such doubt may be resolved in favor of the patent by evidence of successful results where others had tried and failed, especially where such success is in both operative and commercial results.

[Ed. Note.—For cases in point, see Cent. Dig. vol. 38, Patents, § 40.]

8. SAME—PROCESS FOR MAKING SOUND RECORDS.

The Jones patent No. 688,739, for a method of producing sound records for use in talking machines of the gramophone type, which consists in cutting or engraving a record groove of uniform depth, by means of the lateral vibrations of a suitable stylus, upon a disk of waxlike material, coating the same with a conducting material, and then forming a matrix thereon by electrolysis, from which the duplicate records are made by impression, was not anticipated by anything in the prior art, and discloses patentable invention. Also *held* infringed.

Appeals from the Circuit Court of the United States for the Southern District of New York.

For opinions below, see 145 Fed. 636, 643.

These causes come here upon appeals from decrees of the United States Circuit Court for the Southern District of New York, dismissing bills alleging infringement by defendants of complainant's patent No. 688,739, granted December 10, 1901, to Joseph W. Jones, for a process of producing sound records. The opinions of the court below are reported in 145 Fed. 636, 643.

Philip Mauro and C. A. L. Massie, for appellant.

Horace Pettitt, for appellee Universal Talking Mach. Mfg. Co.

Samuel Owen Edmonds, for appellee American Record Co.

Before WALLACE, LACOMBE, and TOWNSEND, Circuit Judges.

TOWNSEND, Circuit Judge. The court below, upon a well-considered and exhaustive discussion of the patented process and of the prior art, and of the other evidence, held that the patent disclosed a patentable process, but said as follows:

> "The step by which the tablet is cut into or engraved by the lateral movement of the stylus, instead of such undulations being traced or etched, was perhaps a step forward. Old ideas and suggestions, however, which are found in prior publications, were used to produce the better result. This achievement did not involve the ingenuity of an inventor, but comes within the limit of the skilled in that class of workmanship. What the patentee accomplished is thought to fall within the rule laid down in the following cases: Locomotive Works v. Medart, 158 U. S. 68, 15 Sup. Ct. 745, 39 L. Ed. 899; Smith v. Nicholls, 88 U. S. 112, 22 L. Ed. 566; Pennsylvania Company v. Locomotive Company, 110 U. S. 490, 4 Sup. Ct. 220, 28 L. Ed. 222."

The facts chiefly relied on to support this conclusion as to invalidity of the patent are the following:

The patented process applied to cylindrical records of varying depth was described and shown in the prior Young patent, which purported to cover "improvements in connection with (inter alia) gramophones," thus, it is claimed, implying the process applied to a disk. The prior Edison British patents referred to phonograms "in the form of a disk, * * * and the marks are to be either in straight lines, spiral, zigzag, or in any other convenient form," and stated that "the reproduction of the phonogram from a matrix * * * may be made upon a * * * plate."

The prior unexpired Bell & Tainter patent, No. 341,214, was, broadly, for the process of cutting or engraving sound records in wax. One of the claims of said patent was as follows:

"9. The method of forming a sound or speech record which consists in engraving or cutting the same in wax or a wax-like composition, substantially as described."

And it is argued, and Berliner testified, that—

"this whole matter of cutting a gramophone record directly in wax or other solid material was thoroughly familiar to all of us, but on account of the very broad scope of the Bell & Tainter patent no attempt was made to make such records for commercial use, because we felt sure that the Bell & Tainter patent would be sustained against them."

But even if, for the sake of the argument, we assume the correctness of the assertion of the complainant, in this record and otherwise, as to the broad scope of said Bell & Tainter patent and the effect of its disclosures, it is clear that no actual inventor of the improvement covered by the patent in suit would have been deterred by any such apprehensions from applying for a patent for such improvement. In fact, no such excuse appears to have been thought of or suggested by counsel or experts for defendant in the suit against the defendant, the Universal Company. The court record of the Bell & Tainter patent shows that the would-be improvers upon the art therein disclosed continually and persistently patented and defended constructions which embodied the inventions described therein. The defendant, the Universal Company, commenced its infringement of the patent in suit more than a year before the expiration of the Bell & Tainter patent. And the Bell & Tainter patent did not deter this patentee, Jones, from seasonably filing his application in 1897. In view of the now confessed superiority and commercial success of the product of the patent in suit, it may safely be assumed that its inventor, by obtaining a patent, might at any time have secured, by license or otherwise, a substantial consideration therefor. In any event, he might have applied for the patent, and thus placed himself in a position to commence operations thereunder immediately upon the expiration of the Bell & Tainter patent. And it is a sufficient answer to the testimony of Berliner, quoted above, that he was not in fact deterred by any such considerations when he applied for a patent for the invention in suit before the expiration of the Bell & Tainter patent.

An examination of the Bell & Tainter patent shows that the assumptions as to its broad scope are without foundation. There is not a word of reference in the specifications to the engraving laterally of undulating records, or of any records of uniform depth. And the experience of complainant with said patent, and the evidence as to the experiments of Tainter, one of the patentees, in connection therewith, show that it never served as a disclosure of the process of the patent in suit. Even the complainant, which was the owner of the Bell & Tainter patent, never succeeded in obtaining a practical disk record until it adopted the process of the patent in suit.

As to the prior Edison patents, it is evident, as the court below suggests, that he "had in mind a record of the vertically undulating type." That he never had in mind the flat disk Jones record is sufficiently shown by the failure of defendants to introduce any evidence that he ever applied his invention to the production of such disks.

The arguments based on the prior Berliner patents, as a disclosure of the process of the patent in suit, are sufficiently disposed of by the foregoing considerations, by the finding of the court below that "the series of acts described in the Jones patent produced a definite and useful result essentially different from that described in the patents to Berliner," by Berliner's failure to claim that said patents disclosed said invention, and by his oath in his application for a patent for said process that it was a patentably novel invention, and by the fact that the process of the patent in suit has completely displaced that of the Berliner process.

Futhermore, Berliner, in his Franklin Institute lecture in 1895, described a method of making duplicates from his etched zinc disks, and, stating the objections to practical use, concluded that these objections would shortly be obviated. Ten years later, when he was called as a witness in this suit against the American Record Company, he fails to state that he ever overcame said objections or devised a practical method of duplication, but merely says that, because of the Bell & Tainter patents, "I felt that there was no use in following up a method of cutting a record in wax or other solid material."

The Young British patent, No. 1,487, is manifestly the closest reference in the prior art, for it discloses substantially the process of the patent in suit applied to the production of vertically undulating grooves in a cylindrical record. Referring to said patent, the court below said as follows:

> "The skilled artisan doubtless would have had little difficulty in adjusting the various elements so that a flat sound record of the type in question could have been produced without experimentation or the trials of an inventor. I think that the patent not only indicates that the process described might substantially be used in the way pointed out by Jones, but also that the patentee contemplated the application of his invention to the disk record."

But the language of the Young specification would seem to indicate that the patentee, like Edison, had in mind the application of his process to cylindrical records only. The opening statement in the specification is as follows:

> "My present invention relates to a method of and a means for reproducing any number of duplicates or counterparts of sound records that have been engraved, indented or otherwise produced upon the rotund or cylindrical recording surfaces of phonographs, gramophones, graphophones," etc.

Furthermore, the steps in the specified process indicate that they are to be taken in connection with a cylindrical record, and involve the destruction of the original and the collapsing of the duplicate, with the consequent risk of injury.

The court below, in a full, fair, and accurate presentation of all the material and salient facts in this case, has held that the patented process produced a novel and useful result, but that it was within the limit of the skilled workman. It is upon this latter point that we feel constrained to differ with the court below. We think that it gave too much weight to the effect of the disclosures of the Young patent. And we conclude, in the light of the prior art, that the changes from Young to Jones involved invention, because, inter alia, Jones was practical, Young was impractical; Young was before the public for six years before any "skilled artisan" succeeded "in adjusting the various elements so that a flat sound record of the type in question could be produced," and no one prior to Jones saw that it could be adapted to a practical disk record with lateral undulations; there were inherent objections to the practical production of varying depth records, which Jones found did not exist when the known or suggested processes were applied to laterally undulating grooves of even depth.

If further evidence of the patentable novelty of the Jones process be sought, it may be found in the deposition of Charles S. Tainter, a graphic record of unsuccessful efforts, unrealized anticipations, and abandoned experiments. Where an existing process or device thus discloses what appear to be insuperable objections to practical operation, it is persuasive evidence of invention that an improver has the foresight and courage to break away from such disclosure and conceive of some new method involving a different principle; but it is also evidence of invention if one, by taking a step forward, sees that what appeared to be barriers to progress are mere obstructions to side paths and byways, and that the road to a practical invention lies straight before him. The record of the litigations involving the patentability and infringement of the devices employed in this new sound producing art shows that inventors and skilled mechanics were engaged in a struggle to devise and construct improvements upon the existing devices, to overcome the objections to their practical operation, and thus widen their field of use. In the case at bar, it is shown that it did not occur to any one before Jones that the old use of the varying depth process on cylindrical records could be adapted to a new use with a uniform depth process on flat records with a useful and practical result.

The courts have generally found it inadvisable to attempt to define invention, and, concluding that there are no affirmative rules by which to determine its presence or absence in every case, have recognized and applied certain negative tests to establish want of invention. Walker on Patents, §§ 24, 29. But where, upon the application of these tests, the question of invention is still left in doubt, such doubt may be resolved in favor of the patent by evidence of successful results where others have tried and failed. This doctrine has not only been repeatedly asserted and applied by the United States Supreme Court, from Loom Co. v. Higgins, 105 U. S. 580, 26 L. Ed. 1177, down to Carnegie Steel Co. v. Cambria Iron Co., 185 U. S. 403, 22 Sup. Ct. 698, 46 L. Ed. 968, but by this court in numerous decisions, where, as in the case at bar, it was argued that the means provided were so simple and obvious that they could not have involved invention. A few of these cases will illustrate the lengths to which this court has gone in applying this principle.

In Singer Mfg. Co. v. Schenck, 77 Fed. 841, 844, 23 C. C. A. 494, this court said as follows:

> "In view of the prior state of the art thus exhibited, it seems now to have been a very simple thing to do what was done by the patentees. * * * But the record in this case affords extrinsic evidence of a most convincing kind that what was done by the patentees was not an obvious thing, and that the change of organization was not one which the skilled mechanics of the par-

ticular art could have suggested and introduced without the exercise of inventive faculty. This evidence is supplied, not only by the many patents for improvements, which fell short of producing the simple, compact, less expensive, and more efficient bearings of the patent, but by the sterility, during 20 years, of the great army of mechanics employed by the various sewing-machine manufacturers."

In Brunswick v. Thum, 111 Fed. 904, 50 C. C. A. 61, the patent covered merely an upgrade portion inserted in a bowling-alley returnway. There the court said as follows:

"The improvement consists in an extremely simple, and, it would seem, perfectly obvious, application of common knowledge as to the law of gravitation. Were there nothing in the record but the bare statement of facts above set forth, we would be inclined to concur with the court below in the proposition that, 'had any skilled mechanic been asked to perfect a structure that should gradually arrest the momentum of the returning ball, an ascent would obviously have been the structure needed.' But in this case, as in the Singer Case, the evidence shows conclusively, and indeed without contradiction, that this very demand for an arrester of the returning ball was before skilled mechanics for many years, and yet no one before Reisky hit upon the device, which now seems so obvious."

In George Frost Co. v. Cohn, 119 Fed. 505, 56 C. C. A. 185, where the invention consisted in the substitution of a button of rubber or similar material for a metal button in a hose supporter, this court said as follows:

"Whether the feature of novelty is the employment of a new material, or a change of adaptation in other respects, the inquiry always is whether what was done involved the exercise of inventive faculty as distinguished from the ordinary skill of the calling. When the substitution has accomplished a result which those skilled in the art had long and vainly sought to effect, the evidence that it involved something beyond the skill of the calling is so persuasive that it generally resolves the inquiry in favor of patentable novelty. Applying that rule to the present case, we conclude that the patent in suit, as regards the claim in controversy, is not valid for want of patentable novelty."

Upon the same ground, in Brown v. Huntington Piano Co., 134 Fed. 735, 67 C. C. A. 639, this court sustained a patent for a minor improvement in making the adjustment of a music desk on a piano automatic; and in Rumford Chemical Works v. Baking Co., 134 Fed. 385, 67 C. C. A. 367, the patent was sustained where the change from the prior art consisted in substituting granular for pulverulent material in baking preparations.

In these circumstances, the disk produced by the patented process responds to the test of success where others have failed. But, in addition to this inventive success, it is also a commercial success. And this success is not subject to the criticism that it is due to extensive advertising, or the attractive manner of placing the articles before the public, or "the energy with which they were forced upon the market." McClain v. Ortmayer, 141 U. S. 419, 428, 12 Sup. Ct. 76, 35 L. Ed. 800. Nor is the disk merely such an element of a device that its sales may be ascribed to the popularity of other elements thereof, or of the entire organism. Doig v. Morgan, 122 Fed. 460, 59 C. C. A. 616. The patentable novelty of the process of the patent is not only indicated by large sales, but also by the unassailable evidence of that most sincere form of flattering recognition, namely, imitation and appropriation by rival manufacturers. In short, it has so far supplanted all other methods previously used that apparently all disk records are now made by said process, and complainant's chief competitor admits that it has discarded its own patented etching process and has substituted therefor the process of the patent in suit. The validity of the patent is thus established by commercial success, resultant solely from inventive success, and such extensive public use as to supersede disks made by other processes, which is "pregnant evidence of its novelty, value, and usefulness." Magowan v. New York Belting & Packing Co., 141 U. S. 332, 343, 12 Sup. Ct. 71, 35 L. Ed. 781.

As to the objections raised that the patent in suit covers a mere mode of operation, we concur in the conclusion of the court below that the process of the patent in suit was a patentable one.

The contentions in support of the defense of noninfringement do not require extended discussion. The defendant, the Universal Company, denies infringement, under a claim that its tool does not cut or engrave its soft material, but displaces it. It does not appear from the evidence that defendant does not use the patented process in making its commercial records. The result of an inspection thereof indicates that they are formed by "cutting or engraving upon a tablet of suitable material by means of * * * a suitable stylus," as claimed in the patent in suit. Therefore, as this court said in Hemolin Co. v. Harway Co. (C. C.) 131 Fed. 483, 487, "if the defendants can prove to the contrary, they should do so."

The defendant, the American Record Company, denies infringement, on the ground that it does not impress the matrix of the patent "into a tablet of suitable material," because it interposes a process of making an additional matrix, not included in the patented process, and impresses this additional matrix into the material. In effect, it claims that although it employs the first processes of the patent to make the matrix and the last process of the patent to make the commercial record, yet because of the interposition of a superfluous additional duplicating process it escapes infringement. It is unnecessary to refer to the authorities that such a claim is without merit.

The decrees are reversed, with costs, and the causes are remanded to the court below, with instructions to enter decrees for injunctions and accountings in accordance with this opinion.

VICTOR TALKING MACH. CO. et al. v. AMERICAN GRAPHOPHONE CO.

(Circuit Court of Appeals, Second Circuit. January 14, 1907.)

No. 116.

1. PATENTS—CONSTRUCTION OF CLAIMS—PROCEEDINGS IN PATENT OFFICE.

Where it is shown that a patentee has acquiesced in the rejection of broad claims by the Patent Office by their cancellation and the substitution of narrower claims therefor, the limitations thus introduced into such claims must be read and interpreted in the light of the circumstan-